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This thesis focuses on a cohort of unrestricted line (URL) officers who graduated from the Naval Postgraduate School (NPS) in 1985 through 1991. The thesis begins with a description of the officers and their subspecialty codes. Patterns of subspecialty utilization are then analyzed by rank, designator, and gender.

Results show that the subspecialty utilization rate (as of 1991) for the cohort is 32.4 percent; and the utilization rate for those with degrees from the Department of Administrative Sciences is 85.5 percent. Most officers were Commanders (54.6 percent) at the time of the study, and 87.1 percent were in compliance with Department of Defense (DoD) guidelines for utilization. Surface warfare officers accounted for 41.5 percent of the 1985 cohort; and 75.4 percent met the DoD utilization guidelines. The cohort consisted mostly of males (85.9 percent), 80.7 percent of whom were utilized in compliance with DoD guidelines.

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Further research should be conducted with respect to the graduate education policies of other Services, that NPS seek to develop a more accurate procedure and data base for tracking its graduates, and that the Navy consider modifying the current policy for subspecialty utilization.

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Subspecialty Utilization in the Navy: A Longitudinal Analysis of Unrestricted Line Officers who Graduated From the Naval Postgraduate School

by

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Lieutenant, United States Navy
B.A., The College of Wooster, 1986

Submitted in partial fulfillment
of the requirements for the degree of

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ABSTRACT

This thesis focuses on a cohort of unrestricted line (URL) officers who graduated from the Naval Postgraduate School (NPS) in 1985. The thesis begins with a description of the officers and their subspecialty codes. Patterns of subspecialty utilization are then tracked for six-to-seven years and analyzed by rank, designator, and gender.

Results show that the subspecialty utilization rate (as of 1991) for the total cohort is 82.4 percent; and the rate for the Department of Administrative Sciences is 85.5 percent. Surface warfare officers (SWO) accounted for 41.5 percent of the 1985 cohort; and 75.4 percent met the Department of Defense (DoD) utilization guidelines. The cohort consisted mostly of men (85.9 percent), 80.7 percent of whom were utilized in compliance with DoD guidelines.

Conclusions are that women tend to increase utilization rates, while SWOs and Pilots tend to suppress them. Full compliance with DoD guidelines may not be optimal or desirable. The future role of women in the military may decrease utilization rates. Recommendations are offered to improve methods of tracking officers and possibly raise current rates of subspecialty utilization.

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I. INTRODUCTION

The primary objective of this thesis is to collect, describe, and evaluate data on the subspecialty utilization of unrestricted line (URL) officers who have received a master's degree from the Naval Postgraduate School (NPS). "Subspecialty utilization" occurs when an individual with a graduate education is assigned to a billet or position (P-Coded billet) recognized as one using a specific academic discipline. An officer graduating from NPS receives a P-Code. This P-Code remains with the officer until he or she successfully completes a utilization tour in a P-Coded billet. Then, through board action, the officer's P-Code is changed to a Q-Code, indicating successful completion of a utilization tour. Department of Defense (DoD) compliance is another term used throughout the thesis. The Department of Defense requires that officers who have received a funded graduate degree be utilized in an appropriate billet within two tours of having received their degree. This requirement is outlined in the Department of Defense Directive 1322.10.

This study will help to determine if the Navy is utilizing its officers in so-called "pay-back tours."[1] Initial

[1] Naval officers who receive funded graduate education incur a service obligation in exchange for that education. The obligation is currently three years in return for the first year of

expectations are that the Navy is not receiving as great a return on its investment as it could. Specifically, most URL officers will not be assigned to a payback tour immediately after graduation due to Navy distribution policy and career path requirements. Therefore, a naval officer must be utilized in a subspecialty billet at the next shore duty or some time later in the officer's career. However, in the latter case, DoD compliance is not achieved. Additionally, utilization of the officer's subspecialty code (SSC) may never occur if the officer resigns or retires prior to a utilization tour.

Another problem is that the greater the length of time between learning skills and utilizing them, the less skill competence will be retained by the officer. There is a certain loss or deterioration of knowledge that is found to occur over time among officers who do not apply that knowledge in an occupational area. At the same time, obsolescence may occur in technical areas during the interim period. This implies that greater time is required to re-acquaint the officer to material once learned, but now forgotten, and to learn new information to become current in a particular subspecialty.

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graduate education, and month-for-month thereafter. This obligation, in addition to the requirement for subspecialty utilization, is referred to as a "payback tour."

The following is a brief discussion of the topics covered in this thesis. Chapter II provides an overview of the Navy's graduate education policy, obligated service, and utilization requirements. Chapter III discusses human capital theory in relation to why graduate education and its utilization are important to the Navy and the naval officer. Also discussed in this chapter is the theory concerning memory retention. Chapter IV reviews literature on the subjects of utilization of graduate education and graduate education in general. A descriptive analysis of the data is presented in Chapter V, first, by subspecialty codes and, then, by selected characteristics of naval officers. Chapter VI combines the theory of Chapter III, the literature of Chapter IV, and the data of Chapter V in a discussion concerning the importance of a graduate education and whether the Navy is optimizing the return on its investment in graduate education. Also presented here are a review of the methodology used in this thesis, conclusions, and recommendations for further analysis.

II. BACKGROUND

This chapter focuses briefly on the recent history of the Naval Postgraduate School (NPS) as it relates to subspecialty codes (SSC). Then, the current graduate education, obligated service, and utilization policies are outlined and discussed, as well as other instructions from the Department of Defense (DoD), Secretary of the Navy, and NPS.

Lieutenant Commander Hurst and Lieutenant Shaddix, in their master's thesis, summarize the history of NPS from the Weakley-Daniels Board, which was appointed by the Chief of Naval Personnel in 1956. A major problem faced by the Board was to determine ways to fill technical billets that needed to be filled by unrestricted line (URL) officers through a selection board procedure for the Navy Postgraduate Education Program. The Board concluded that volunteers alone would not fill the need for technically-trained officers. Therefore, the Board recommended that all eligible officers be "considered by a single selection board."(Hurst and Shaddix, 9) Evidence of the Board still exists in the form of the annual OPNAVNOTE 1520, which establishes, among other things, officer eligibility for consideration by the Postgraduate Selection Board.

The Postgraduate Education Selection Board determined that the ideal time to select officers to attend NPS was in the third year of commissioned service for surface warfare officers and in the fifth year of service for aviators. The officers were notified of their selection prior to rotation to shore duty.

In 1959, the Keith Board established subspecialties. The purpose of the Board was to increase the number of officers with graduate education in specific fields, achieve greater "channelization" of duty assignments in subspecialty areas, adapt to changes in promotional concepts, and set a minimum of two tour assignments in subspecialty areas (Hurst and Shaddix, 12). The result was OPNAVINST 1040, "Career Management of Naval Officers."

The Navy became concerned about technical obsolescence, the gradual decrease of a person's ability to maintain knowledge of a subject (in this case a graduate degree). It was believed to occur mainly from non-use of technical skills, inability (or lack of motivation) to remain current on a subject, or a combination of the two. In June 1969, the National Science Foundation published a study entitled "Continuing Education for Research and Development Careers." The researchers on the study concluded that there were several types of obsolescence. One type is when the individual does not keep up with new knowledge in his or her technical field. Another type is when an individual keeps up with a very narrow

segment of the field but loses contact with broader changes. A third type of technical obsolescence is when the individual's career line evolves from one interest to another, so that he or she moves away from an original field of training into another one that is not very closely related. (Hurst and Shaddix, 15)

A. GRADUATE EDUCATION POLICY

Department of Defense (DoD) Directive 1322.10, "Policy on Graduate Education for Military Officers" (August 31, 1990) and OPNAVINST 5450.210B delineate the Navy's need for officers with graduate-level education. These documents also provide guidance on utilization of the officer's education. Graduate education (either Navy-sponsored through NPS, funded civilian education, or tuition assistance, or non-Navy sponsored) benefits the Navy and the individual by encouraging higher levels of professional knowledge and technical competence. This provides incentives for recruitment and retention of personnel with the ability, the dedication, and the capacity for growth, while recognizing the educational aspirations of individuals. (DoD Directive 1322.10, 1)

The primary goal of Navy-funded graduate programs is to provide naval officers with the education they need (general and specific education, discussed in Chapter III, Theory) to be qualified for a subspecialty, or P-Coded billet. Officers

may pursue fully-funded graduate education at NPS, selected DoD institutions, and civilian institutions. Under the *fully-funded* program, officers attend school full-time, receive all pay and benefits, and pay no tuition (it is paid for by the Navy). Officers enrolled in full-time, *non-funded* programs attend school full-time, receive full pay and benefits, and pay their own tuition (except if sponsored by a non-Navy-funded scholarship). (OPNAVINST 1520.23B, 1)

Graduate education is designed to fill current and future Navy needs in operational, technical, and managerial areas. The Officer Subspecialty System is outlined in OPNAVINST 1000.16H, "Manual of Navy Total Force Manpower" and NAVPERS 15839G, "Manual of Navy Officer Manpower and Personnel Classifications Volume I: Major Code Structures." These instructions are used in applying the "various billet and position classification subsystems." Subspecialty codes and the criteria for identifying subspecialty officers and billets are also detailed in OPNAVINST 1000.16H and NAVPERS 15839G.

The Graduate Education Review Group (GERG) provides an annual review of graduate education issues. In addition, a Graduate Education Review Board (GERB), acting as the Board of Trustees for NPS, establishes policy guidance and direction, long-range goals and objectives, and resource oversight for the fully-funded graduate education program. The composition

of the GERG and GERB is set forth in OPNAVINST 1000.16H, "Manual of Navy Total Force Manpower".

B. OBLIGATED SERVICE

Department of Defense Directive 1322.10, "Policy on Graduate Education for Military Officers" (August 31, 1990), and OPNAVINST 1520.23B, "Graduate Education" (October 1, 1991), outline obligated service for officers attending a graduate education program while on active duty. Upon accepting fully-funded graduate education, officers are obligated to serve on active duty upon completion or termination of the education program three years for the first year of school and one month for each month of education thereafter.

C. UTILIZATION

As stated in OPNAVINST 1520.23B:

> Officers who have received Navy funded graduate education will serve one tour in a validated subspecialty position as soon as possible but not later than the second tour following graduation. Exceptions must be approved by the Chief of Naval Personnel (PERS-4). This policy will not be waived for personal preference.(OPNAVINST 1520.23B, 2)

Officers are to serve in as many positions in related subspecialty billets as Navy requirements and career development will permit.

D. OTHER INSTRUCTIONS

SECNAVINST 1524.2A, "Policies Concerning the Naval Postgraduate School," establishes the rationale for NPS as follows:

> The NPS exists for the sole purpose of increasing the combat effectiveness of the Navy and the Marine Corps. It accomplishes this by providing post-baccalaureate degree and non-degree programs in a variety of sub-specialty areas not available through other educational institutions. The NPS also supports the DoN through continuing programs of naval and maritime research and through the maintenance of an expert faculty capable of working in, or as advisors to, operational commands laboratories, systems commands, and headquarters activities of the Navy and Marine Corps.(SECNAVINST 1524.2A, 1)

Programs of education shall not be offered at NPS if programs of comparable cost, quality, and focus are readily available at other institutions.(SECNAVINST 1524.2A, 3)

The Memorandum for the Chief of Naval Personnel, "Navy Subspecialty Utilization and Department of Defense (DoD) Guideline Compliance," publishes biennially the utilization rates of officers using DoD recommendations, overall utilization rates, and particular subspecialty utilization rates. These figures are published by OP-11 (now PERS-213) and PERS-4 in the Navy.

III. THEORY

A. HUMAN CAPITAL INVESTMENT

1. Introduction

Investment in human capital is a "term that conceptualizes workers as embodying a set of skills that can be 'rented out' to employers."(Ehrenberg, 299) This thesis focuses on the educational aspects associated with human capital.

Education is comprised of three major costs: direct expenses, foregone earnings, and psychic losses (Ehrenberg, 301). Direct expenses for naval officers include such costs as moving, settling down, books and supplies, time studying, and so on. Foregone earnings for naval officers are expressed in terms of lost operational experience and lack of competition with peers. Psychic loss is the most nebulous of the three categories and the term is generally used to capture all other costs incurred while the individual is not being educated. The most common example of psychic loss is classroom boredom.

All of these costs are incurred with the expectation that the investment in education will leave the officer and the Navy better off in the future. From education, a naval

officer gains academic knowledge that he or she expects to make use of in the Navy. Graduate education may also be pursued by an officer as a way to "punch a ticket" for promotion, advancement, or a choice assignment; or to gain education to be used as a credential, considered valuable in pursuing a post-service, civilian career. This behavior is explained by human capital theory as building up "productive stock" in order to attain a job in the Navy (or in civilian life) that is desired. An important topic of this thesis is whether or not the Navy places a high enough value on this education to employ its officers in jobs utilizing their new skills.

2. Demand for Education

For most, if not all, naval officers, the benefits of attending graduate school are seen as long-term. These benefits are in the form of higher earnings through promotion and access to more interesting and challenging jobs.

Benefits that are received in the future are worth less to an officer now than an equal amount of benefits received today, just as a dollar today is worth more than a dollar received some time in the future. The discount rate or interest rate used to convert future payments to present values is assumed to be high for most graduate education, given the rate at which technology advances and the rate at

which information is forgotten. Therefore, a naval officer will receive more benefit from this educational experience if he or she is utilized immediately after, or soon after, graduation than if not utilized until later. One must also consider the fact that some officers who attend NPS or a civilian university merely do so to "punch a ticket" (as previously noted). These officers do not intend to utilize their subspecialty education, but realize their goal when they get promoted. In this case, their discount rate is very low. Technology changes and memory retention are irrelevant; only changes in Navy policy concern these officers.

3. Education and Earnings

Officers undertake an investment in education with the expectation that, by doing so, they can improve their earnings over time. But, the Navy must be willing to pay more for these officers. As Adam Smith wrote over 200 years ago, "[T]he wages of labour vary with the easiness and cheapness, or the difficulty and expense of learning the business." (Smith, 42.)

Initially, this is the case. For example, officers who attend NPS receive all pay and benefits and pay no tuition. However, once the officer graduates from NPS, he or she is frequently returned to the fleet and may not be assigned initially to an occupation where the education can be

utilized. If this continues into the next tour, the officer may never utilize his or her subspecialty. But, the officer's chances of getting promoted by having a graduate degree are probably enhanced.

This is not optimal for the Navy--the Navy's return on its investment could be significantly improved. In essence, a number of naval officers attend NPS and get promoted but never get assigned to a position that is directly related to their graduate education. The Navy is paying for the officer's time and tuition at NPS, and paying the officer a higher salary once promoted, but it is not getting the full value of what the officer has learned unless the officer is placed in a billet where his or her education can be most effectively utilized. At the same time, many officers do utilize their subspecialties and thus comply with DoD regulations and fulfill the economic principle that Adam Smith referred to in the beginning of this section.

4. Conclusion

A naval officer deciding whether to attend NPS naturally asks: "Will I increase my monetary and psychic income enough to justify the costs of graduate education?" Government policymakers trying to decide whether to expand educational facilities or subsidize increased enrollment, on

the other hand, must ask: "Will the benefits of improved productivity outweigh the costs?"

This analysis of human capital theory is unable to account for the contribution that an individual's innate ability makes to higher earnings from the contribution made by additional schooling. That is, officers who are smarter, harder-working, and more dynamic are probably more likely to seek further education and thus be more productive and gain advancement opportunities than if they did not obtain the education.

B. MEMORY RETENTION

In the late 17th Century, John Locke described, quite eloquently, what happens when knowledge learned is not applied and reinforced practically:

> The memory of some men, it is true, is very tenacious, even to a miracle; but yet there seems to be a constant decay of all our ideas, even to those which are struck deepest in the minds the most retentive; so that if they be not sometimes renewed by repeated exercise of the senses, or reflection on those kinds of objects which at first occasioned them, the print wears out, and at last there remains nothing to be seen.(Locke, 149)

In most cases, forgetting is not a malady of memory, but a condition of its health. Individuals often remember clearly and well as long as they are using the knowledge; and, then, when it is no longer required, there follows a rapid and extensive decay of the "traces."(James, 449) When a subject

is recalled repeatedly after it is learned, the subject remains in the mind. However, when a subject is learned and not recalled for some time, the record of the subject is not preserved as well as when it was first learned, and one has some difficulty in attempting to remember it.

Studies indicate that there are two general ways information is retained. The first is contemplation, keeping an idea in mind for some time. The other is memory, reviving in our minds ideas that have disappeared. To improve memory, an individual must improve the habitual methods of recording facts. There are three methods employed. The first is use of mechanical methods, which consist of intensification, prolongation, and repetition of the idea to be remembered. The second is use of judicial methods, which is nothing more than a logical way of conceptualizing, rationalizing, classifying, and analyzing details into groups. The third is ingenious methods, which is often a creative story or acronym that, when recalled, "triggers" a string of events desired to be remembered (James, 437). Some ideas are remembered more than others because they are either more recent, more interesting, or more often repeated.

When not in direct use, a popular way to retain knowledge is to periodically refer to something connected with it. Often, this takes the form of technical journals. However, it

is common knowledge that active learning (learning by doing) is more beneficial than passive learning (learning by reading or by lecture), since active learning involves more of the senses which, in turn, creates a more lasting impression in the mind. Thus, even reference to the best technical journals may not be an adequate substitute for applying ideas that have been learned.

For this reason, psychologists place a great deal of emphasis on retention and the transfer of learning. Their goal is to maintain a "positive transfer" from the classroom situation, which results in better performance. During the education process, this may be accomplished in a number of ways:

- Make education realistic and applicable;
- Provide as much experience as possible in the task being taught;
- Have the students practice their newly-learned skills in actual situations that they will encounter on their jobs;
- Provide for a variety of examples when teaching concepts or skills;
- Identify important features of a concept;
- Ensure that general principles are understood before expecting much transfer;
- Provide students with knowledge, skills, and feelings of self-efficacy to self-regulate their own behaviors on the job; and
- Design the educational content so that students can see its applicability (Wexley and Latham, 96).

Technical change is another factor that must be accounted for when discussing memory retention as it pertains to the application to work. Technical change often includes the introduction of new products, new techniques, and new technologies that reduce the cost of capital--that is, make the operation more efficient. Theoretically, these technological changes affect the demand for labor by shifting the demand curve and also changing its elasticity (or how responsive the demand for labor is to a change in technology). These effects benefit the "consumer" of what is being produced by lowering the cost of doing business. Further, a substitution effect occurs, which produces new production techniques. In other words, if technical advances are not kept up to date, the organization becomes antiquated and inefficient. For the Navy, this means that an officer who is not utilizing a subspecialty is probably not able to keep up to date with technological changes, thus becoming unable to have a strongly positive effect on the organization. Evidence from an NPS thesis, which surveyed 826 officers about the "technical obsolescence" of their degree, tends to support this point and suggests that "technical obsolescence" occurs within three to four years after graduation.(Hurst and Shaddix, 49)

By not utilizing an officer with a subspecialty immediately after graduation from NPS or any other graduate school, the Navy is not gaining a full return on its investment, and the officer is probably losing a portion of what was learned as well as falling behind in certain technological areas. Navy policymakers should ask: "Are the *benefits* from the current Navy policy (with its operational focus) greater than the *costs* (pecuniary, loss of expertise, and technical obsolescence) associated with sending officers to NPS and then not utilizing them until several years later, or not at all?" If the answer is "yes," then the current policy need not be modified. However, if the answer is "no," or even "not sure," then policymakers must reconsider the way in which officers with graduate education are utilized.

As discussed in the introduction, the DoD goal is to utilize Navy-funded graduates within two tours after their graduation. For general unrestricted line officers, a leadership, or department head tour frequently follows graduation from NPS. For other unrestricted line (URL) officers, though, the first tour after graduation from NPS is normally an operational sea tour; and the first opportunity to comply with DoD guidelines is the next shore tour. Some officers intend to "punch other tickets" after obtaining their graduate degree during this tour, and thus violate DoD

guidelines. As a result, the Navy may not be receiving the best return on its investment from URL officers as it could if all URL officers immediately utilized their subspecialties in a specifically-related billet.

IV. LITERATURE REVIEW

A. DEFINED UTILIZATION STUDY

Literature on the utilization of Naval Postgraduate School (NPS) graduates is limited to a thesis by LT James R. Wilson, entitled "Postgraduate Education and Professional Military Development: Are They Compatible?" The short answer to the question posed in Wilson's thesis title is "not really." The reason for this apparent incompatibility is twofold. First, the career paths of URL officers are well-established and geared toward the continuation of one's warfare specialty. (See Appendix A for career progression paths of URL officers.) Any change in a typical career path, no matter how slight, often carries consequences for the URL officer if he or she desires to remain competitive with peers. The second reason is that most officers come to NPS for their first shore tour, and because of their career paths, must return to sea duty after graduation. Since this occurs for the majority of URL officers, there is, realistically, only one remaining tour in which to comply with the DoD goal of 100 percent utilization within two tours after graduation from NPS.

Wilson also examined the issue of whether or not utilization rates for NPS graduates are tied to the

availability of P-Coded billets. It was Wilson's conclusion that a lack of P-Coded billets was not a valid cause of the low utilization rates he found. By his calculations, the lowest billet-to-officer ratio (for selected URL officers and selected restricted line officers) was 1.6:1; that is, in 1991, there were 1.6 P-Coded billets per Surface Warfare Officer (1110) with a subspecialty in the study.[2] The highest ratio was 21.3:1 for Pilots (1310). Among the hypothesized reasons for low utilization rates are that the officers themselves may choose not to serve in a P-Coded billet; or the warfare officer community managers and officer detailers may not be requiring adherence to the commitment officers incur when they attend NPS--namely, that they will serve in a utilization or "payback" tour after graduation.

Wilson employed the same general methodology used by the Bureau of Naval Personnel (PERS-213) in its semi-annual report, entitled "Navy Subspecialty Utilization and Department of Defense (DOD) Guideline Compliance." (This document is reviewed in Chapter II, Background.) Briefly, both the PERS-213 report and Wilson's study merged personnel data from the Navy Billet File and the Officer Master File (OMF). Wilson calculated that 22.2 percent of Manpower, Personnel, and

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[2] The numbers in parentheses are the officer designators. See the Methodology section in Chapter V for a complete listing of URL officer designators.

Training Analysis graduates were in compliance with the DoD requirement of utilization within two tours of receiving a master's degree. This DoD compliance rate was based on the career paths of officers from 1986 through 1991 for all designators. The PERS-213 utilization rate is determined by taking a "snapshot" of each data file and calculating the figures. The PERS-213 report found a DoD compliance rate of 71.1 percent--considerably higher than that of Wilson's thesis. Some reasons for the large variation in values are obvious. Wilson followed a specific cohort of officers (from 1986 through 1991) to obtain his figures, whereas PERS-213 obtained its figures from a "snapshot" of the data. Wilson has accounted for personnel leaving and entering his database by following specific officers. The PERS-213 data do not account for either.

B. GRADUATE EDUCATION

General studies concerning graduate education are of help in providing background, theories, and other ideas to pursue. The first of these studies,entitled "Graduate Education and the Promotion of Officers"(1986), is by Donald Cymrot from the Center for Naval Analyses (CNA). Cymrot researched the question of what is the optimal level of graduate education. Economic theory succinctly defines the optimal level at the

point where marginal cost equals marginal benefit.[3] The costs associated with graduate education are easy to find and quantify for analysis. However, the benefits of graduate education, while often easy to identify, are typically difficult to quantify. An attempt is made to quantify the marginal benefit to the Navy of a graduate-educated officer by defining an "index of productivity" for each rank; and, the higher the rank, the higher one's marginal productivity. This is done for officers with graduate education and for officers without graduate education.

Two problems arise in the Cymrot study. One problem is uncertainty, because all officers, *ceteris paribus*, are not promoted at the same time and at the same rate. Another problem is selectivity bias, because Cymrot must assume that graduate-educated officers are as productive as non-graduate-educated officers. The bias enters mainly because of the selection process for acceptance to graduate institutions. Not all officers are chosen to attend graduate school, and the criteria used by Cymrot include an officer's perceived productivity, and future productivity, to the Navy.

Using cross-sectional data from the OMF from 1985, a logit empirical model was formulated to analyze the data. Cymrot

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[3] See Cymrot's study, "Determining the Optimal level of Graduate Education for Naval Officers," which details the marginal cost and marginal benefit analysis.

discovered that graduate education increased the probability of promotion to Lieutenant Commander in the Navy by 26 percent, to Commander by 10.6 percent, and to Captain by 16.5 percent. Other factors that Cymrot found as significantly affecting an officer's probability of promotion were time-in-rank (the lower the better), age (the older the better), designator (URL officers are promoted faster to Lieutenant Commander than either staff or restricted line officers), and length-of-service (the longer the better). Sex and race were not found to be statistically significant.

Cymrot concluded that graduate education aids naval officers in early promotion and ensures eventual promotion. Further, graduate education for officers in more senior ranks tends to be more important for retention rather than an indicator of excellence through early promotion. Cymrot concluded, therefore, that a graduate-educated URL officer is better off than an URL officer who does not have a graduate-level degree.

Lieutenant Kenneth Steiner also researched the benefits of graduate education for URL officers in his master's thesis, entitled "Navy-Funded Graduate Education: Do the Navy and URL Officer Benefit?" Steiner found that officers with Navy-funded graduate degrees tend to stay in the service longer and

are promoted faster than graduates of non-Navy-funded programs or those who did not possess a master's degree.

Steiner attempted to determine if the Navy benefits by funding URL officers in graduate education and if URL officers benefit in their naval careers by attending a Navy-funded school as compared with those who choose a non-Navy-funded school or choose not to obtain a master's degree. His goal was to determine whether differences in survivor rates and time-in-rank were statistically significant among the three comparison groups: Navy-Funded Master's Degree (NFM), Non-Navy-Funded Master's Degree (NNFM), Non-Master's Degree (NM).

Steiner's data were obtained from the OMF through the Defense Manpower Data Center (DMDC), and included officers from 1978 through 1985. His results indicated that differences in survivor rates and time-in-rank were statistically significant.[4] Officers with a Navy-funded

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[4] There are two problems with the way Steiner presents time-in-rank. The first is that officers receive their master's degree at different points in their career. A majority of the people who attend the Naval Postgraduate School do so as Lieutenants after their first sea tour. For these officers, the amount of time spent in the training command and the length of the first sea tour can vary tremendously. For a surface warfare officer, this is usually four to five years; for an aviator the time may be as much as five to six years. This means that an aviator is usually one or two year-groups senior to the surface warfare officer. According to Steiner's measurement, this problem shows up as a significant difference in time to promotion between the two officers. Further, it is clear that no comparisons can be made between the quality of these two individuals.

graduate degree tended to stay in the service longer, that is, for the length of their obligated service. NNFM officers separated within the first two years after graduation. Further, Navy-funded graduate degree officers were promoted faster than either of the other groups, especially from O-4 to O-5 (where promotion is nearly two months sooner). NFM and NNFM were promoted from O-3 to O-4 faster than NM by a ratio of two to one.

Steiner concluded from the study that the Navy benefits significantly by investing in graduate education. An officer who receives a Navy-funded graduate education remains in the military significantly longer than officers in the other two groups (6.4 total years or 1.1 years longer).[5] The URL officer also benefits from Navy-funded graduate education: promotion occurs, on average, six months sooner than for

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The second problem with Steiner's time-in-rank data is the manner in which the Navy promotes officers. For any particular year-group, all officers promoted are arranged according to lineal number (seniority), and officers are promoted in order, with the number each month determined by Congressional authorization. Steiner, again, measured this as a quality difference, when in fact it may be a seniority difference.

With the large number of officers that Steiner examined, these problems may not have significantly affected his results if all groups had the same length of service distribution. Steiner shows these distributions in his thesis, and draws the conclusion that the distributions were significantly different.

[5] Officers stay in longer because, if for no other reason, they have incurred an obligation for service by attending NPS or accepting a Navy-funded graduate education.

officers coming from the other two groups. This is expected, since the Navy chooses the officers in the top ten percent of the rankings to attend Navy-funded graduate education.

Assuming that Cymrot and Steiner are both correct in their conclusions, a URL officer at the rank of Lieutenant graduating from NPS, or from some other Navy-funded graduate institution, can expect to have a 26 percent greater probability of being promoted to Lieutenant Commander than his or her peers who did not obtain a graduate degree; and the graduate-educated officer can expect promotion to Lieutenant Commander six months earlier than his or her peers.

Another study, by LCDR Cecil Hurst and LT James Shaddix, entitled "Opinion Survey of Naval Officers Who Have Received A Navy Sponsored Graduate Degree," focused on determining the attitudes and opinions of Naval officers who had received Navy-sponsored graduate degrees by collecting and analyzing data from an opinion survey. The study was sponsored by the Graduate Education Committee.[6] The data were obtained from a mailed survey of alumni who had received master's degrees from NPS and civilian institutions. Data on graduate-educated

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[6] The general goals of the Graduate Education Committee are: to determine the role of graduate education in preparing a naval officer for the future, to determine how best to fit graduate education in the officer's career path, and to recommend educational restructuring to enhance the effectiveness of the Naval Postgraduate School.

officers were also obtained from the Bureau of Naval Personnel. The total number of officers surveyed from NPS and the civilian institutions was 1,265 (25 percent of all naval officers with a master's degree who were still on active duty). The total number of NPS alumni surveyed was 732, and the total number from civilian institutions was 533. Only 826 responded in the allotted time, for a response rate of 65.3 percent.

Hurst and Shaddix found that 70.9 percent of naval officers with a graduate degree believed that a graduate education should be obtained within the five- to eight-year point of a career, but only 38.6 percent actually did so. Graduate education was found to be a positive influence on retention for the officers surveyed.

Since a vast majority of officers stayed in the Navy, the Navy's return on its investment was regained and was thus a sound investment, according to the survey respondents. There were three main reasons why naval officers sought a graduate education: to remain competitive with peers by "ticket punching"; to become a more capable officer; and to fulfill educational aspirations. Most officers, 60.8 percent of URL and 76.8 percent of restricted line officers, had been assigned P-coded billets. Technical obsolescence seemed to occur within six years after graduation.

There were two limitations to the study by Hurst and Shaddix. First, all officers with graduate degrees had to be sampled. The Graduate Education Committee's requirements were to sample all communities. Thus, it was not possible to include specific questions concerning particular designators. Second, the "forced response" type of questionnaire was used, and it limited the answers of the respondents.[7]

What are the policies of the other Armed Services concerning graduate education? Lieutenant Colonel Danny Braudrick, in a thesis entitled "U.S. Army Officer Graduate Education: New Methodology for Establishing Requirements and Utilizing Assets," discussed the policies of the Army concerning graduate education at civilian universities. Braudrick defined some costs of the Army Graduate Education System (AGES) that include budgetary costs (such as tuition and fees) as well as opportunity costs (such as an officer's pay and allowances and the burden placed on the operational side of the Army, since these officers are in school rather than on the training grounds). Benefits are identified by Braudrick as the education and development of skilled individuals, the production of knowledge, and the preservation

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[7] Personal bias plays a major role in any survey. Hurst and Shaddix did not make this point clear. For a more in-depth analysis of Steiner's thesis or that of Hurst and Shaddix's, refer to a paper written by the author and LT Dennis Pytel, entitled "Policy Analysis Critique: The Benefits of Graduate Education."

and transmission of knowledge. The author noted that, although these benefits are difficult to quantify, they do increase productivity. Published studies of the civilian labor force support his claim.[8]

Specifically, the Army assigns graduate-educated officers to positions validated by the Army Educational Requirements Board (AERB) six months prior to graduation. (AERB-validated positions are similar to P-Coded billets in the Navy.) The officer is required to serve a three-year tour. The Army is so serious about utilizing its officers with graduate degrees that failure by a commander to assign this "AERB-obligated asset" to a validated position, or to remove an obligated officer from a validated position, can cause loss of the position's validation (that is, the billet could lose its "P-Code" status).[9] There is apparent flexibility in the Army's requirements. For example, an officer, with permission, may postpone his or her "payback" tour until the subsequent tour because of operational needs, compassionate requirements, or professional schooling requirements. Further, the Army makes

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[8] See Theodore Schultz, *The Economic Value of Education* (New York: Columbia University Press, 1963) for more information on the subject.

[9] There have been no documented cases of a position losing its AERB-validation due to a commander's non-compliance as of December 1986.

a concerted effort to *re-utilize* its graduate-educated officers at the Lieutenant Colonel and Colonel level.

The Army established a management information system in 1982, called the Civil Schools Management Information System, to assist the Army in assigning officers to graduate institutions and then utilizing them afterwards. The system is far from perfect. Braudrick suggests that the Army suffers from outdated policies being applied to a new environment. He finds the position-by-position validation process, together with a narrow definition of utilization (from the DoD Directive 1322.10 "Policies on Graduate Education for Military Officers"), is too constricting. He suggests that the U.S. Army Military Personnel Center assign graduate-educated officers to billets with the greatest priority (based on the organization's mission, echelon, and impact of decisions made on the Army).

From this brief review of literature, it can be seen that, however the data on URL officers are analyzed, URL officers who possess a graduate-level education tend to be more promotable and stay in service longer. Further, most URL officers were able to utilize their subspecialties at some point in their careers.

There is, unfortunately, a limited amount of literature available concerning how the Army, Air Force, Marine Corps, or

Coast Guard approach graduate education of their officers. The current method employed by the Army is briefly examined here. In order to comprehend the best ways the Armed Services can educate their officers, it is necessary to understand how each branch approaches the issue. Further research into this topic would prove fruitful to the Navy as well as to the other Services.

V. METHODOLOGY AND RESULTS

A. METHODOLOGY

A cohort was derived from the Officer Master File (OMF) containing all officers who graduated from NPS and obtained a P-Code in 1985. These officers were followed from 1985 through 1991, which covers a total of six or seven years (depending on when in 1985 they received the P-Code). The base year of 1985 was chosen because data from 1983 were missing from the OMF. The year prior to the base year, 1984, was needed to determine who received a P-Code in 1985. If no P-Code showed up in the 1984 Subspecialty Codes (SSC) and showed up in the 1985 SSCs, an officer received his or her P-Code in 1985. Further, all officers were eliminated if they attended NPS for Safety School or held posts at NPS as faculty or staff.

The next step was to eliminate all officers who were not URL officers. The designators for URL officers include the following:

- 1100 General Unrestricted Line (Gen URL) Officers
- 1110 Surface Warfare Officers (SWO)
- 1120 Subsurface Warfare Officers
- 1130 Special Warfare Officers

- 1140 Special Operations Officers
- 1310 Pilots
- 1320 Naval Flight Officers (NFO).

The designators were generalized to include both Navy and Navy Reserve officers into one general designator. For example, NFOs can be designated as Navy or 1320 (meaning they are Naval Academy graduates, reserve officer trainee graduates, or Aviation officer candidate school graduates who have been augmented from Navy Reserve to Navy), or an NFO may be designated Navy Reserve or 1325 (meaning Aviation officer candidate school graduates). Both of these cases have been generalized into one designator called 1320.

The yearly OMF data were merged by social security number. Substring functions were then used to identify the SSCs, P-Codes, and Q-Codes.[10] A routine was used to "flag" the P-Code and determine when the Q-Code was obtained. The difference (to the month) between the Q-Code and P-Code was the time it took to obtain an official Q-Code. If no Q-Code was obtained, or if an officer served in a P-Coded billet unsuccessfully (not obtaining a Q-Code), then he or she was

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[10] As noted in Chapter II, a P-Code is what a naval officer obtains when he or she graduates from NPS. This P-Code is retained until successful completion of a utilization tour, at which time the naval officer's P-Code is replaced with a Q-Code, meaning he or she is a proven subspecialist. See also Appendix B.

"flagged" as "Not Utilized" in a P-Coded billet (utilization tour).

At this point, the designators were divided into two groups: one for the 1100s[11], 1110s, 1120s, 1130s, and 1140s; and one for the 1310s and 1320s. This was necessary because, after graduation from NPS, the first group generally attends department head school (six months) and can expect to serve in two three-year tours for a maximum of six and a half years. The second group, after graduation from NPS, usually attends one or more schools (maintenance, fire fighting, Tactical Action Officer schools, for example) and serves one two-year disassociated sea tour and one three-year shore tour for a maximum of five and a half years. During that time (6.5 or 5.5 years), if a Q-Code is obtained, the officer is said to be in "DoD Compliance," utilizing his or her subspecialty within two tours of graduating from NPS. If the officer obtained a Q-Code, but was outside of the "DoD Compliance" window, he or she is considered utilized, but not in DoD Compliance. If the officer has a P-Code, but not a Q-Code, he or she is considered "Not Utilized" for the purposes of this study. (Note: Since the data set covers only six-to-seven years, it

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[11] The Gen URL officers were placed in this category because their career paths (which do not have a department head school) are closer to the 1110, 1120, 1130, and 1140 designators than for the 1310 or 1320 designators. See Appendix A.

is not possible to distinguish between officers still serving in their P-Coded billet their third tour and officers not yet in a utilization billet. Therefore, the only two categories discussed in this study are "DoD Compliance" and "Not Utilized.")

As a final step, the data were sorted into various groups according to SSCs, rank, designator, and gender. This information forms the main focus of this chapter.

B. RESULTS

The overall "DoD Compliance" rate for NPS was 82.4 percent and the "Not Utilized" rate was 17.6 percent. For the Department of Administrative Sciences, the "DoD Compliance" and "Not Utilized" rates were 85.5 percent and 14.5 percent, respectively. Subsequent sections describe the utilization pattern by NPS subspecialties and by URL officers according to the characteristics of rank, designator, and gender.

1. Utilization Patterns by Subspecialty Codes

For a description of the parts to the subspecialty codes, see Appendix B. The subspecialties under consideration for this study and their associated two-digit SSCs, which will be used throughout this chapter, are listed in Appendix C.

In Tables 1 through 5, every two columns represent a single rank, designator, or gender divided into two sections: "DoD Compliance" and "Not Utilized." Rank definitions and

codes can be found in Appendix D. It can be seen that virtually all officers in this cohort held the rank of Lieutenant Commander, Commander, or Captain as of 1991. It should be emphasized that the rank of an officer does not indicate the rank when the subspecialty was earned or the rank when the Q-Code was obtained. It logically follows that the cohort would be in these rank windows after a six- to seven-year period, since most officers attend NPS as Lieutenants or Lieutenant Commanders.

a. Subspecialty Codes by Rank

Analysis of the column totals in Table 1 shows that officers who received a graduate degree from NPS in 1985 and were still on active duty in 1991 are not in full compliance with the DoD goal of 100 percent utilization within two tours of graduation. The data show that the "DoD Compliance" rates are generally high (with the notable exception of Rear Admiral and Rear Admiral Lower Half, where just four graduates are found). For the Commanders, the largest group, the "DoD Compliance" rate is 87.1 percent. For Captains, the "DoD Compliance" rate is 73.7 percent. For Lieutenant Commanders, the "DoD Compliance" rate is 81.2 percent.

The data on SSCs and rank by curriculum yield some interesting findings. "DoD Compliance" rates overall are

TABLE 1--CURRICULUM AND SUBSPECIALTY CODES BY RANK AND DEPARTMENT OF DEFENSE COMPLIANCE RATES.

Curriculum	P	VADM		RDMU	
	C	DOD Comply	Not Utilized	DOD Comply	Not Utilized
Advanced Sciences	41				
Aeronautical Engineering	71	1			
Aeronautical Engineering- Avionics	72				
Air-Ocean Sciences	47				
ASW Systems	44				
Command, Control and Communications	45				
Communications Engineering	81				
Computer Science	91				
Computer Systems Management	95				
Electronic Systems Engineering	55				
EW Systems Engineering	46				
Financial Management	31			1	
Intelligence	17				
Manpower, Personnel Training Analysis	33				
Material Logistics Support Management	32				
Meteorology	48				
Naval/Mechanical Engineering	54				1
NSA- Europe, USSR	24				
NSA- Far East, SE Asia, Pacific	22				
NSA- Mid East, Africa, South Asia	21				
NSA- Strategic Planning	28				
NSA- Western Hemisphere	23				
Nuclear Physics	67				
Operational Logistics	43				
Operational Oceanography	49				
Operations Analysis	42				
Space Systems Engineering	77				
Space Systems Operations	76				
Transport Management	35				
Underwater Acoustics	56				
Weapons Systems Engineering	61				1
Weapon Systems Sciences	63				
Communications Systems Technology [D]	82				
General Polictical Science [D]	20				
International Negotiations [D]	25				
Strategic Planning (General) [D]	26				
Education and Training Management	37				
Nuclear Propulsions Plant Operations	53				
Chemistry	62				
Total Number		1	0	1	2
Total Percent		100.0%	0.0%	33.3%	66.7%

Note: PC is the numerical Code for a curriculum, or P-Code.

TABLE 1--CURRICULUM AND SUBSPECIALTY CODES BY RANK AND DEPARTMENT OF DEFENSE COMPLIANCE RATES (CONTINUED).

Curriculum	P	RDML		CAPT	
	C	DOD Comply	Not Utilized	DOD Comply	Not Utilized
Advanced Sciences	41				
Aeronautical Engineering	71			1	
Aeronautical Engineering- Avionics	72				
Air-Ocean Sciences	47				
ASW Systems	44			2	
Command, Control and Communications	45				
Communications Engineering	81			2	
Computer Science	91				
Computer Systems Management	95			2	
Electronic Systems Engineering	55			2	
EW Systems Engineering	46				
Financial Management	31			9	1
Intelligence	17				
Manpower, Personnel Training Analysis	33			3	4
Material Logistics Support Management	32				
Meteorology	48				
Naval/Mechanical Engineering	54			2	1
NSA- Europe, USSR	24				
NSA- Far East, SE Asia, Pacific	22				1
NSA- Mid East, Africa, South Asia	21			1	
NSA- Strategic Planning	28				
NSA- Western Hemisphere	23				
Nuclear Physics	67				
Operational Logistics	43				
Operational Oceanography	49		1	1	2
Operations Analysis	42			13	1
Space Systems Engineering	77				
Space Systems Operations	76				
Transport Management	35				
Underwater Acoustics	56				
Weapons Systems Engineering	61			1	3
Weapon Systems Sciences	63				
Communications Systems Technology [D]	82			2	
General Polictical Science [D]	20				
International Negotiations [D]	25				
Strategic Planning (General) [D]	26				
Education and Training Management	37				2
Nuclear Propulsions Plant Operations	53				
Chemistry	62			1	
Total Number		0	1	42	15
Total Percent		0.0%	100.0%	73.7%	26.3%

TABLE 1--CURRICULUM AND SUBSPECIALTY CODES BY RANK AND DEPARTMENT OF DEFENSE COMPLIANCE RATES (CONTINUED).

Curriculum	P	CDR		LCDR	
	C	DOD Comply	Not Utilized	DOD Comply	Not Utilized
Advanced Sciences	41	1			
Aeronautical Engineering	71		1	6	
Aeronautical Engineering- Avionics	72	3		1	
Air-Ocean Sciences	47				
ASW Systems	44	15	1	1	
Command, Control and Communications	45	10		4	
Communications Engineering	81	2		2	1
Computer Science	91	4		6	
Computer Systems Management	95	10		8	
Electronic Systems Engineering	55	3		1	2
EW Systems Engineering	46	10	1	3	
Financial Management	31	13		4	1
Intelligence	17	2		1	
Manpower, Personnel Training Analysis	33	16	3	5	5
Material Logistics Support Management	32				
Meteorology	48		1		
Naval/Mechanical Engineering	54	1		2	
NSA- Europe, USSR	24	1		1	
NSA- Far East, SE Asia, Pacific	22	1			
NSA- Mid East, Africa, South Asia	21				
NSA- Strategic Planning	28				
NSA- Western Hemisphere	23				
Nuclear Physics	67				
Operational Logistics	43				
Operational Oceanography	49	3			
Operations Analysis	42	22		9	1
Space Systems Engineering	77				
Space Systems Operations	76	1			
Transport Management	35			2	
Underwater Acoustics	56	3		1	
Weapons Systems Engineering	61	9	2	2	2
Weapon Systems Sciences	63	2			
Communications Systems Technology [D]	82	9		6	
General Polictical Science [D]	20	2			
International Negotiations [D]	25	1			
Strategic Planning (General) [D]	26	3			
Education and Training Management	37	1	13		3
Nuclear Propulsions Plant Operations	53	1			
Chemistry	62				
Total Number		**149**	**22**	**65**	**15**
Total Percent		**87.1%**	**12.9%**	**81.3%**	**18.8%**

TABLE 1--CURRICULUM AND SUBSPECIALTY CODES BY RANK AND DEPARTMENT OF DEFENSE COMPLIANCE RATES (CONTINUED).

Curriculum	P	Total	Percent	Total	Percent	Total	Total
	C	DOD Comply	DOD Comply	Not Utilized	Not Utilized	Number	Percent
Advanced Sciences	41	1	100.0%	0	0.0%	1	100.0%
Aeronautical Engineering	71	8	88.9%	1	11.1%	9	100.0%
Aeronautical Engineering- Avionics	72	4	100.0%	0	0.0%	4	100.0%
Air-Ocean Sciences	47	0	0.0%	0	0.0%	0	0.0%
ASW Systems	44	18	94.7%	1	5.3%	19	100.0%
Command, Control and Communications	45	14	100.0%	0	0.0%	14	100.0%
Communications Engineering	81	6	85.7%	1	14.3%	7	100.0%
Computer Science	91	10	100.0%	0	0.0%	10	100.0%
Computer Systems Management	95	20	100.0%	0	0.0%	20	100.0%
Electronic Systems Engineering	55	6	75.0%	2	25.0%	8	100.0%
EW Systems Engineering	46	13	92.9%	1	7.1%	14	100.0%
Financial Management	31	27	93.1%	2	6.9%	29	100.0%
Intelligence	17	3	100.0%	0	0.0%	3	100.0%
Manpower, Personnel Training Analysis	33	24	66.7%	12	33.3%	36	100.0%
Material Logistics Support Management	32	0	0.0%	0	0.0%	0	0.0%
Meteorology	48	0	0.0%	1	100.0%	1	100.0%
Naval/Mechanical Engineering	54	5	71.4%	2	28.6%	7	100.0%
NSA- Europe, USSR	24	2	100.0%	0	0.0%	2	100.0%
NSA- Far East, SE Asia, Pacific	22	1	50.0%	1	50.0%	2	100.0%
NSA- Mid East, Africa, South Asia	21	1	100.0%	0	0.0%	1	100.0%
NSA- Strategic Planning	28	0	0.0%	0	0.0%	0	0.0%
NSA- Western Hemisphere	23	0	0.0%	0	0.0%	0	0.0%
Nuclear Physics	67	0	0.0%	0	0.0%	0	0.0%
Operational Logistics	43	0	0.0%	0	0.0%	0	0.0%
Operational Oceanography	49	4	57.1%	3	42.9%	7	100.0%
Operations Analysis	42	44	95.7%	2	4.3%	46	100.0%
Space Systems Engineering	77	0	0.0%	0	0.0%	0	0.0%
Space Systems Operations	76	1	100.0%	0	0.0%	1	100.0%
Transport Management	35	2	100.0%	0	0.0%	2	100.0%
Underwater Acoustics	56	4	100.0%	0	0.0%	4	100.0%
Weapons Systems Engineering	61	12	60.0%	8	40.0%	20	100.0%
Weapon Systems Sciences	63	2	100.0%	0	0.0%	2	100.0%
Communications Systems Technology [D]	82	17	100.0%	0	0.0%	17	100.0%
General Polictical Science [D]	20	2	100.0%	0	0.0%	2	100.0%
International Negotiations [D]	25	1	100.0%	0	0.0%	1	100.0%
Strategic Planning (General) [D]	26	3	100.0%	0	0.0%	3	100.0%
Education and Training Management	37	1	5.3%	18	94.7%	19	100.0%
Nuclear Propulsions Plant Operations	53	1	100.0%	0	0.0%	1	100.0%
Chemistry	62	1	100.0%	0	0.0%	1	100.0%
All Curricula		**258**	**82.4%**	**55**	**17.6%**	**313**	**100.0%**

Source: Compiled from data provided by the Defense Manpower Data Center and PERS-213.

reasonably high (82.4 percent), but still somewhat below the goal of full (100 percent) compliance. The "DoD Compliance" rates for most curricula exceed 75 percent, while some are found to be in full compliance. But further inspection shows that most of the curricula with 100 percent "DoD Compliance" have a low number of officers. Discounting the curricula with five or fewer total officers, the NPS curricula with the *highest* "DoD Compliance" rates are Command, Control, and Communications (XX45P), Computer Science (XX91P), Computer Systems Management (XX95P), and Communications Systems Technology (XX82P), all with 100 percent utilization. Using the same criteria, the curricula with the *lowest* "DoD Compliance" rates are Education and Training Management (XX37P), with a "DoD Compliance" rate of 5.3 percent; and Operations Oceanography (XX49P), with a "DoD Compliance" rate of 57.1 percent.[12]

As seen in Appendix C, the highest "DoD Compliance" rates for curricula within the Department of Administrative Sciences are Computer Science (XX91P), Computer Systems Management (XX95P), and Communications Systems Technology

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[12] It is interesting to note that Education and Training Management is a curriculum where officers attend civilian universities and obtain a P-Code from NPS upon graduation. This curriculum is examined in a master's thesis by LT Aron L. Gladney, "Evaluation of the U.S. Navy Education and Training Management Subspecialty Program."

(XX82P), all with 100 percent. In this department, curricula with the lowest "DoD Compliance" rates are Education and Training Management (XX37P), at 5.3 percent, and Manpower, Personnel, and Training Analysis (XX33P), with a rate of 66.7 percent.

b. Subspecialty Codes by Designator

Table 2 shows subspecialty utilization rates by designator (or officer community). As seen here, the designators with the highest "DoD Compliance" rates among the subspecialties are the Special Warfare Officers (1130) with 100 percent "DoD Compliance," followed by NFOs (1320) with 94.2 percent, and Gen URL officers (1100) with 93.2 percent. The designators with the lowest "DoD Compliance" rates are SWOs (1110), with 75.4 percent, and Pilots (1310), with 77.5 percent.

Surface Warfare Officers (1110) tend to be concentrated in the following curricula: Operations Analysis (XX42P), Weapons Systems Engineering (XX61P), and Communications Systems Technology (XX82P). Utilization rates for these curricula are 100 percent, 60 percent, and 100 percent, respectively. Pilots (1310) tend to be concentrated most in the Operations Analysis (XX42P), curriculum with 88.9

TABLE 2--CURRICULUM AND SUBSPECIALTY CODES BY DESIGNATOR AND DEPARTMENT OF DEFENSE COMPLIANCE RATES.

Curriculum	P	1100		1110	
	C	DOD Comply	Not Utilized	DOD Comply	Not Utilized
Advanced Sciences	41			1	
Aeronautical Engineering	71				
Aeronautical Engineering- Avionics	72				
Air-Ocean Sciences	47				
ASW Systems	44			6	
Command, Control and Communications	45	2		5	
Communications Engineering	81	1		3	
Computer Science	91	3		2	
Computer Systems Management	95	7		7	
Electronic Systems Engineering	55			5	1
EW Systems Engineering	46			2	1
Financial Management	31	6	1	9	1
Intelligence	17	1			
Manpower, Personnel Training Analysis	33	8		5	7
Material Logistics Support Management	32				
Meteorology	48				1
Naval/Mechanical Engineering	54			3	2
NSA- Europe, USSR	24			1	
NSA- Far East, SE Asia, Pacific	22			1	1
NSA- Mid East, Africa, South Asia	21			1	
NSA- Strategic Planning	28				
NSA- Western Hemisphere	23				
Nuclear Physics	67				
Operational Logistics	43				
Operational Oceanography	49		1	3	1
Operations Analysis	42	2		15	
Space Systems Engineering	77				
Space Systems Operations	76				
Transport Management	35	4			
Underwater Acoustics	56	1		1	
Weapons Systems Engineering	61			12	8
Weapon Systems Sciences	63			1	
Communications Systems Technology [D	82	6		10	
General Polictical Science [D]	20			2	
International Negotiations [D]	25				
Strategic Planning (General) [D]	26			1	
Education and Training Management	37		1	1	9
Nuclear Propulsions Plant Operations	53			1	
Chemistry	62				
Total Number		41	3	98	32
Total Percent		93.2%	6.8%	75.4%	24.6%

Note: PC is the numerical Code for a curriculum, or P-Code.

TABLE 2--CURRICULUM AND SUBSPECIALTY CODES BY DESIGNATOR AND DEPARTMENT OF DEFENSE COMPLIANCE RATES (CONTINUED).

Curriculum	P	1120		1130	
	C	DOD Comply	Not Utilized	DOD Comply	Not Utilized
Advanced Sciences	41				
Aeronautical Engineering	71				
Aeronautical Engineering- Avionics	72				
Air-Ocean Sciences	47				
ASW Systems	44	1			
Command, Control and Communications	45	1		1	
Communications Engineering	81				
Computer Science	91				
Computer Systems Management	95	1			
Electronic Systems Engineering	55				
EW Systems Engineering	46				
Financial Management	31			1	
Intelligence	17			1	
Manpower, Personnel Training Analysis	33		1	2	
Material Logistics Support Management	32				
Meteorology	48				
Naval/Mechanical Engineering	54	2			
NSA- Europe, USSR	24				
NSA- Far East, SE Asia, Pacific	22				
NSA- Mid East, Africa, South Asia	21				
NSA- Strategic Planning	28				
NSA- Western Hemisphere	23				
Nuclear Physics	67				
Operational Logistics	43				
Operational Oceanography	49				
Operations Analysis	42	2			
Space Systems Engineering	77				
Space Systems Operations	76				
Transport Management	35				
Underwater Acoustics	56	1			
Weapons Systems Engineering	61				
Weapon Systems Sciences	63	1			
Communications Systems Technology [D	82				
General Polictical Science [D]	20				
International Negotiations [D]	25				
Strategic Planning (General) [D]	26			1	
Education and Training Management	37				
Nuclear Propulsions Plant Operations	53				
Chemistry	62				
Total Number		9	1	6	0
Total Percent		90.0%	10.0%	100.0%	0.0%

TABLE 2--Curriculum and Subspecialty Codes by Designator and Department of Defense Compliance Rates (Continued).

Curriculum	P	1310		1320	
	C	DOD Comply	Not Utilized	DOD Comply	Not Utilized
Advanced Sciences	41				
Aeronautical Engineering	71	5	1	3	
Aeronautical Engineering- Avionics	72	2		2	
Air-Ocean Sciences	47				
ASW Systems	44	4	1	7	
Command, Control and Communications	45	2		3	
Communications Engineering	81	2	1		
Computer Science	91	2		3	
Computer Systems Management	95	1		4	
Electronic Systems Engineering	55			1	1
EW Systems Engineering	46	4		7	
Financial Management	31	7		4	
Intelligence	17	1			
Manpower, Personnel Training Analysis	33	5	3	2	1
Material Logistics Support Management	32				
Meteorology	48				
Naval/Mechanical Engineering	54				
NSA- Europe, USSR	24				
NSA- Far East, SE Asia, Pacific	22				
NSA- Mid East, Africa, South Asia	21				
NSA- Strategic Planning	28				
NSA- Western Hemisphere	23				
Nuclear Physics	67				
Operational Logistics	43				
Operational Oceanography	49		1	1	
Operations Analysis	42	16	2	9	
Space Systems Engineering	77				
Space Systems Operations	76	1			
Transport Management	35				
Underwater Acoustics	56	1			
Weapons Systems Engineering	61				
Weapon Systems Sciences	63				
Communications Systems Technology [D	82			1	
General Polictical Science [D]	20			1	
International Negotiations [D]	25	1			
Strategic Planning (General) [D]	26			1	
Education and Training Management	37		7		1
Nuclear Propulsions Plant Operations	53				
Chemistry	62	1			
Total Number		55	16	49	3
Total Percent		77.5%	22.5%	94.2%	5.8%

Source: Compiled from data provided by the Defense Manpower Data Center and PERS-213.

percent utilization. Naval Flight Officers (1320) can be found mostly in Operations Analysis (XX42P) curriculum, ASW Systems (XX44P), and EW Systems Engineering, all with 100 percent utilization.

c. Subspecialty Codes by Gender

As seen in Table 3, the "DoD Compliance" rate for female officers (93.2 percent) exceeds that of male officers (80.7 percent) by 12.5 percentage points. The curricula with the most female officers are Manpower, Personnel, and Training Analysis (XX33P) with 100 percent utilization; Financial Management (XX31P) with 85.7 percent utilization; and Communications Systems Technology (XX82P) and Computer Systems Management (XX95P), both with 100 percent utilization. The following curricula have the most male officers: Operations Analysis (XX42P) with 95.4 percent utilization; Manpower, Personnel, and Training Analysis (XX33P) with 50 percent utilization; Financial Management (XX31P) with 95.4 percent utilization; Weapon Systems Engineering (XX61P) with 60 percent utilization; and Education and Training Management (XX37P) with 5.6 percent utilization.

2. Utilization Patterns of Navy Officers

Using the same cohort, the data are analyzed to determine the utilization patterns of Navy officers by rank, designator, and gender. Data in this section are presented

TABLE 3--CURRICULUM AND SUBSPECIALTY CODES BY GENDER AND DEPARTMENT OF DEFENSE COMPLIANCE RATES.

Curriculum	P	*Female*		*Male*	
	C	DOD Comply	Not Utilized	DOD Comply	Not Utilized
Advanced Sciences	41			1	
Aeronautical Engineering	71			8	1
Aeronautical Engineering- Avionics	72			4	
Air-Ocean Sciences	47				
ASW Systems	44			18	1
Command, Control and Communications	45	2		12	
Communications Engineering	81	1		5	1
Computer Science	91	3		7	
Computer Systems Management	95	6		14	
Electronic Systems Engineering	55			6	2
EW Systems Engineering	46			13	1
Financial Management	31	6	1	21	1
Intelligence	17	1		2	
Manpower, Personnel Training Analysis	33	9		12	12
Material Logistics Support Management	32				
Meteorology	48				1
Naval/Mechanical Engineering	54			5	2
NSA- Europe, USSR	24			2	
NSA- Far East, SE Asia, Pacific	22			1	1
NSA- Mid East, Africa, South Asia	21			1	
NSA- Strategic Planning	28				
NSA- Western Hemisphere	23				
Nuclear Physics	67				
Operational Logistics	43				
Operational Oceanography	49		1	4	2
Operations Analysis	42	2		42	2
Space Systems Engineering	77				
Space Systems Operations	76			1	
Transport Management	35	4			
Underwater Acoustics	56	1		3	
Weapons Systems Engineering	61			12	8
Weapon Systems Sciences	63			2	
Communications Systems Technology [D]	82	6		11	
General Polictical Science [D]	20			3	
International Negotiations [D]	25			1	
Strategic Planning (General) [D]	26			3	
Education and Training Management	37		1	1	17
Nuclear Propulsions Plant Operations	53			1	
Chemistry	62			1	
Total Number		**41**	**3**	**217**	**52**
Total Percent		**93.2%**	**6.8%**	**80.7%**	**19.3%**

Note: PC is the numerical Code for a curriculum, or P-Code.

Source: Compiled from data provided by the Defense Manpower Data Center and PERS-213.

for all NPS graduates and then for graduates in the Department of Administrative Sciences.

a. Navy Officers by Rank

As noted above, the "current" ranks (as of 1991) of the 1985 cohort members were used for this analysis. Thus, it makes sense that there would be no Lieutenants remaining in the 1985 cohort.

As shown in Table 4, the rank with the greatest number of officers from the 1985 cohort is Commander with 171 officers, or 54.6 percent of the total officers in the 1985 cohort. There were 80 Lieutenant Commanders, accounting for 25.6 percent of the total; and 57 Captains, for 18.2 percent of the total. The highest "DoD Compliance" rates for specific ranks (with five or more officers) are found for Commanders with 87.1 percent and Lieutenant Commanders with 81.2 percent. The lowest utilization rate was for the Captains, with 73.7 percent "DoD Compliance."

The Department of Administrative Sciences has a similar distribution of ranks. It can be seen in Table 5 that the most represented ranks in the department were Commanders with 58 officers, or 46.8 percent of the total, and Lieutenant Commanders with 41 officers, or 33.1 percent. Commanders were proportionally underrepresented (by 7.8 percentage points) when compared to the NPS rates, and Lieutenant Commanders were

TABLE 4--U.S. NAVY OFFICER'S RANK, DESIGNATOR, AND GENDER FOR THE NAVAL POSTGRADUATE SCHOOL BY DEPARTMENT OF DEFENSE COMPLIANCE NUMBER AND RATE.

Selected Characteristic	DoD Compliance		Not Utilized		Total	Total
Rank	Number	Percent	Number	Percent	Number	Percent
VADM	1	100.0%	0	0.0%	1	0.3%
RDMU	1	33.3%	2	66.7%	3	1.0%
RDML	0	0.0%	1	100.0%	1	0.3%
CAPT	42	73.7%	15	26.3%	57	18.2%
CDR	149	87.1%	22	12.9%	171	54.6%
LCDR	65	81.2%	15	18.8%	80	25.6%
LT	0	0.0%	0	0.0%	0	0.0%
Total	258	82.4%	55	17.6%	313	100.0%
Designator						
1100	41	93.2%	3	6.8%	44	14.1%
1110	98	75.4%	32	24.6%	130	41.5%
1120	9	90.0%	1	10.0%	10	3.2%
1130	6	100.0%	0	0.0%	6	2.0%
1140	0	0.0%	0	0.0%	0	0.0%
1310	55	77.5%	16	22.5%	71	22.7%
1320	49	94.2%	3	5.8%	52	16.6%
Total	258	82.4%	55	17.8%	313	100.0%
Gender						
Female	41	93.2%	3	6.8%	44	14.1%
Male	217	80.7%	52	19.3%	269	85.9%
Total	258	82.4%	55	17.6%	313	100.0%

Source: Compiled from data provided by the Defense Manpower Data Center and PERS-213.

proportionally overrepresented (by 7.4 percentage points greater than theNPS rates). Analyzing the "DoD Compliance" rates for specific ranks, the highest rates are found for Commanders with 93.1 percent. This is approximately 6 percentage points higher than the rate for NPS as a whole. "DoD Compliance" rates were lower for Lieutenant Commanders, with 85.4 percent, and for Captains, with 68.2 percent. (These were 4.1 and 5.5 percentage points, respectively, lower than the NPS rates.)

The majority of the officers are in compliance with the DoD regulation of utilizing their subspecialties within two tours after graduation from NPS. Commanders and Lieutenant Commanders have the highest rates and, by the time an officer is promoted to Captain, more than two out of three have been utilized in a subspecialty tour.

b. U.S. Navy Officers by Designator

All URL officer designators were represented by the 1985 cohort except for Special Operations (1140). As seen in Table 4, SWOs (1110) had the greatest number of people in this cohort, with 130 officers or 41.5 percent of the total 1985 cohort. Pilots (1310) accounted for the next largest designator, with 71 officers or 22.7 percent of the total 1985

TABLE 5--U.S. NAVY OFFICER'S RANK, DESIGNATOR, AND GENDER FOR THE DEPARTMENT OF ADMINISTRATIVE SCIENCES BY DEPARTMENT OF DEFENSE COMPLIANCE NUMBER AND RATE.

Selected Characteristic	DoD Compliance		Not Utilized		Total	Total
Rank	Number	Percent	Number	Percent	Number	Percent
VADM	1	100.0%	0	0.0%	1	0.8%
RDMU	1	100.0%	0	0.0%	1	0.8%
RDML	0	0.0%	1	100.0%	1	0.8%
CAPT	15	68.2%	7	31.8%	22	17.7%
CDR	54	93.1%	4	6.9%	58	46.8%
LCDR	35	85.4%	6	14.6%	41	33.1%
LT	0	0.0%	0	0.0%	0	0.0%
Total	106	85.5%	18	14.5%	124	100.0%
Designator						
1100	36	97.3%	1	2.7%	37	29.8%
1110	34	75.6%	11	24.4%	45	36.3%
1120	1	50.0%	1	50.0%	2	1.6%
1130	3	100.0%	0	0.0%	3	2.4%
1140	0	0.0%	0	0.0%	0	0.0%
1310	15	79.0%	4	21.1%	19	15.3%
1320	17	94.4%	1	5.6%	18	14.5%
Total	106	85.5%	18	14.5%	124	100.0%
Gender						
Female	36	97.3%	1	2.7%	37	29.8%
Male	70	80.5%	17	19.5%	87	70.2%
Total	106	85.5%	18	14.5%	124	100.0%

Source: Compiled from data provided by the Defense Manpower Data Center and PERS-213.

cohort. The NFOs (1320) and Gen URL officers (1100) were next with 16.6 percent and 14.1 percent, respectively, of the 1985 cohort. The fewest officers could be found in Subsurface Warfare (1120) and Special Warfare (1130), with 3.2 percent and 1.9 percent, respectively, of the 1985 cohort.

The highest "DoD Compliance" rates were found in the following designators: Special Warfare Officers (1130) with 100 percent; NFOs (1320) with 94.2 percent; Gen URL officers (1100) with 93.2 percent; and Subsurface Warfare Officers (1120) with 90.0 percent. The lowest "DoD Compliance" rates occurred for: Pilots (1310) with 77.5 percent and SWOs (1110) with 75.4. Officers in these designators can be expected to have relatively low "DoD Compliance" rates, since the SWOs (1110) have many milestones to complete to maintain their competitiveness within the community. Thus, there would be little time for a utilization tour within the "DoD Compliance" window or utilization at all.[13] Pilots (1310), too, have many career milestones to meet. They must also maintain their "currentness" in terms of required flight time over the course of a year, and they must additionally meet a minimum number of goals per month (for

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[13] This point is illustrated in the career path diagrams presented in Appendix A. It can be seen here that the URL officers have a number of career milestones that place limitations on detailers and on an officer's ability to comply with DoD regulations.

example, in terms of approaches, night time approaches, and Naval Air Training and Operations Standardization evaluations).

Table 5 shows that most officers who received a degree from the Department of Administrative Sciences in 1985 were SWOs (1110), accounting for 36.3 percent of the total, followed by Gen URL officers (1100) at 29.8 percent. Pilots (1310) and NFOs (1320) made up 15.3 percent and 14.5 percent, respectively, of the total number of officers in the 1985 cohort. The Special Warfare (1130) and Subsurface officers (1120) had the smallest representation at 2.4 percent and 1.6 percent, respectively, of the 1985 cohort.

The proportion of SWOs (1110) in the Department of Administrative Sciences is 5.2 percentage points below the NPS total. Subsurface Warfare Officers (1120), Pilots (1310), and NFOs (1320) are also somewhat underrepresented in the Department of Administrative Sciences, based on their proportion in the 1985 cohort as a whole. This underrepresentation can be partially explained by the attraction of Aeronautical Engineering to Pilots (1310) and NFOs (1320) and the attraction of Nuclear Physics or Underwater Acoustics to some Subsurface Warfare Officers (1120). Conversely, the Gen URL (1100) and Special Warfare Officers (1130) are overrepresented in the Department of

Administrative Sciences based, on their proportion in the 1985 cohort as a whole.

In terms of "DoD Compliance" for specific designators in the Department of Administrative Sciences, Table 5 shows that the designators with the highest "DoD Compliance" rates for the 1985 cohort were: Special Warfare (1130) with 100 percent, Gen URL officers (1100) with 97.3 percent, and NFOs (1320) with 94.4 percent. Special Warfare Officers (1130) are on par with the NPS percentage. The "DoD Compliance" rate for Gen URL officers (1100) is 4.1 percentage points above the rate for NPS. The rate for NFOs (1320) in the Department of Administrative Sciences curricula was approximately equal to the rate for NPS as a whole. The lowest "DoD Compliance" rates for the 1985 cohort were found for Subsurface Warfare Officers (1120), with 50.0 percent "DoD Compliance;" SWOs (1110), with 75.6 percent; and Pilots (1310), with 79 percent. The SWOs (1110) from the Department of Administrative Sciences had a utilization rate that was approximately equal to the NPS percentage. The Pilots (1310) were 1.5 percentage points below the NPS percentage. The same reasons, as mentioned above, partially explain why the designators that fell well below the "DoD Compliance" rates were below "DoD Compliance" for the Department of Administrative Sciences.

Most officers in the 1985 cohort were SWOs (1110). The smallest proportions of officers could be found in Subsurface Warfare (1120), Special Warfare (1130), and Special Operations (1140). "DoD Compliance" rates for the designators tend to be in the range of 82 percent.

c. U.S. Navy Officers by Gender

As shown in Table 4, the number of men in the 1985 cohort (as of 1991) was 269, accounting for 86 percent of the total. The number of women in the same cohort was 44, constituting 14 percent. The "DoD Compliance" rate for female officers was 93.2 percent, less than the DoD goal but greater than the "DoD Compliance" rate of 80.7 percent found for their male counterparts.

In the Department of Administrative Sciences the total number of women was 37, representing 29.8 percent. This is 15.7 percentage points above the proportion of women in the 1985 cohort as a whole. Conversely, the proportion of men who received a degree in the Department of Administrative Sciences (70.2 percent or 87 officers) is correspondingly below the NPS percentage (85.9 percent). The "DoD Compliance" rate for female officers was 97.3 percent, just 2.7 percent below full compliance and 4.1 percent above the utilization rate for female graduates in the total 1985 cohort. The "DoD

Compliance" rate for male officers was 80.5 percent, about the same as it was for NPS as a whole.

The data on "DoD Compliance" by gender reveal that women officers are utilized in an appropriate subspecialty at a rate that is close to 100 percent. This is true for both the Department of Administrative Sciences and NPS as a whole. At the same time, "DoD Compliance" occurs for four out of five male officers within the Department of Administrative Sciences and the total 1985 cohort.

VI. SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

A. SUMMARY

The purpose of this thesis has been to collect, describe, and evaluate data on the subspecialty utilization of URL officers who received a master's degree from NPS in 1985. The officers were tracked for a six- to seven-year period following graduation, which coincides roughly with the time (two tours) specified for compliance with DoD guidelines. The base year of 1985 was chosen because data from 1983 were missing from the Officer Master File (OMF). The year prior to the base year, 1984, was needed to determine who received a P-Code in 1985.

The data presented on subspecialty utilization of URL officers reveal that "DoD Compliance" for the NPS class of 1985 is 82.4 percent; and "DoD Compliance" for graduates of curricula in the Department of Administrative Sciences is 85.5 percent, about 3 percentage points greater than the rate for NPS as a whole. Still, both rates are less than the goal of full compliance established by DoD.

The greatest number of 1985 graduates (a total of 46 officers) had a P-Code in the Operations Analysis (XX42P) subspecialty with a utilization rate of 95.7 percent. The

Manpower,Personnel, and Training Analysis (XX33P) subspecialty had the second largest number of officers (36), and a utilization rate of 66.7 percent. This was followed by Financial Management (XX31P), with 29 officers and a utilization rate of 93.1 percent.

Analysis of the 1985 cohort by rank revealed that most (over half) of the officers were Commanders as of 1991, with a utilization rate of 87.1 percent. A total of 80 officers were at the rank of Lieutenant Commander, with a utilization rate of 81.3 percent. The Department of Administrative Sciences had similar distributions and utilization rates as those for the entire cohort.

Analysis of the cohort by designator revealed that over 40 percent of the officers were SWOs (1110), with a utilization rate (75.4 percent) that was somewhat below the overall rate. The Department of Administrative Sciences had a similar distribution of SWOs (1110) and nearly the same utilization rate. Designators that had greater than 90 percent utilization included: Special Warfare Operations (1130) with 100 percent, NFOs (1320) with 94.2 percent, Gen URL officers (1100) with 93.2 percent, and Submarine Warfare Officers (1120) with 90 percent. The same is not true for the Department of Administrative Sciences. Designators that had greater than 90 percent utilization within the department

included: Special Warfare Operations (1130) with 100 percent, Gen URL officers (1100) with 97.3 percent, and NFOs (1320) with 94.4 percent.

Analysis by gender revealed that women accounted for one of every seven officers in the 1985 cohort. Female officers were utilized at a rate (93.2 percent), which was considerably higher than the cohort as a whole. At the same time, male officers, had a utilization rate of 80.7 percent. There were proportionately more women in the Department of Administrative Sciences, where women accounted for nearly one-third of all officers. The utilization rate for female officers from the Department of Administrative Sciences was also proportionately higher (97.3 percent) than for NPS as a whole. In the next section, several conclusions are presented, based on the results of the data analysis.

B. CONCLUSIONS

What does this mean for NPS and the Navy? In the introduction to this thesis, it was hypothesized that the Navy may not be getting as high of a return as possible on its investment in graduate education. This hypothesis is apparently supported by the data analysis presented in Chapter V, though the reasons for less than total compliance are not completely known. Four out of five URL officers were utilized in a subspecialty designated for their P-Codes within the

timeframe set by DoD. It is less than clear whether this should be considered "high" or "low," relative to the utilization rates of other cohorts or the experiences of other Armed Services. Although a utilization rate of over 80 percent may appear to be adequate, it still falls short of full compliance with DoD regulations. Does this also mean that the Navy is not taking full advantage of its investment in graduate education or properly using its officers? This question is difficult to answer without knowing more about the optimal (as opposed to required) level of utilization for P-Coded officers in the Navy. In all likelihood, full utilization is neither optimal nor desirable from the standpoint of organizational effectiveness. Some P-Coded officers may be superior performers in operational billets that are not defined as P-Coded billets. Taking these officers away from the jobs they do best for the primary purpose of achieving "full utilization," then, would not be desirable.[14]

On the other hand, in the recent years of declining budgets, shrinking appropriations, and fewer personnel, it would be improvident not to maximize the use of every dollar

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[14] The problem of utilization of graduate-educated officers, then, may be partially one of selection to NPS rather than assignment to a utilization tour after graduation from NPS. The Recommendations Section, below, briefly addresses this issue, in the context of extending the window for DoD compliance.

spent. Yet, the data suggest that the Navy has not maximized the return on its investment, failing to assign a considerable proportion of graduate-educated officers to billets where their education is utilized (by definition) to the greatest possible extent.

Eventually, the vast majority of graduate-educated officers serve in a P-Coded billet. But how effective are these officers when tasked to perform a job for which they were educated several years previously? The answer is that they are probably *not* as effective as they could have been if utilized immediately after graduation, understanding, of course, that operational necessity must take precedence. There are, then, several factors working against NPS and the Navy as they strive to attain the best or most complete utilization of NPS graduates. These factors are return on investment, operational necessity, and depreciation of assets (for example, technical obsolescence and knowledge deterioration).

It is clearly important for the Navy to maximize the return on its investment in graduate education. The wedge against utilization for many URL officers is that they must go to sea immediately after graduation. While the Navy is not gaining a direct return on its investment with this policy, it does receive some reward by having a more educated officer in

the fleet. A graduate-educated officer probably has better cognitive abilities, analytical skills, and leadership tools than he or she had before attending graduate school--and these sharpened qualities, or educational attributes, will make an important contribution to the officer's performance throughout the fleet. Furthermore, a great deal of useful information, especially in the management curricula, can be used by officers on a daily basis.

Technical obsolescence was discussed in Chapter III. While it is important for the Navy to maintain its operational focus, it must also recognize the added benefits of utilizing graduate-educated officers in a timely fashion, while their newly-acquired knowledge (especially in technical fields) is fresh and still current. As discussed in the section on memory retention, individuals often remember clearly and well while they are using their knowledge; and, then, when it is no longer required, or if it is not used soon after it is learned, there follows a rapid and extensive decay of the knowledge.

It was pointed out in the literature review that warfare specialty milestones often conflict with the ability of a graduate-educated naval officer to be utilized in a subspecialty. These milestones are requisite to being promoted. Previous research indicates that graduate education

is also a significant factor in whether an officer gets promoted. It seems logical to conclude, then, that an important reason why career-oriented naval officers attend NPS is to "punch a ticket." Previous research also shows that continuation rates in the Navy tend to be significantly higher for officers with graduate education than for those without such education. What better way for an officer to increase his or her chances for continuation in the military, especially during the uncertainty of a force drawdown, than to incur an obligated period of service tied to graduate education? Further, it was concluded in a previous study that graduate-educated officers tend to be promoted faster than their peers without a graduate education. Clearly, officers who attend NPS are career-oriented. Thus, what better way to enhance job security and increase promotion probabilities than to obtain a graduate education? The cost to the naval officer of attending NPS, in terms of optimal career paths, is fairly low, and the naval officer is probably maximizing his or her own return on investment.

Some insightful conclusions can be drawn from this study based on the trends identified in the data analysis. First, the Department of Administrative Science's utilization rate (85.5 percent) is slightly higher than the overall NPS rate (82.4 percent). The reason for this higher rate can be

partially explained by the larger proportion of women in the Department of Administrative Sciences. Women account for 14.1 percent of the total 1985 cohort. In comparison, women account for 29.8 percent of officers in the Department of Administrative Sciences, nearly twice the level found in NPS as a whole. It can also be seen that the female utilization rate is much higher than that of their male counterparts. Indeed, for NPS, the rate for women is 12.5 percentage points greater than for men; and in the Department of Administrative Sciences, it is 16.8 percentage points greater than the rate for men.

Second, SWOs (1110) and Pilots (1310) account for almost two out of three officers in the total 1985 cohort (41.5 percent for SWOs (1110) and 18.8 percent for Pilots (1310)). Both of these communities have the lowest overall "DoD Compliance" rates (75.4 and 77.5 percent, respectively). Some reasons were noted in Chapter V that explained why these two communities, in particular, had lower "DoD Compliance" rates compared to the other communities. Briefly, the reasons are that both designators are comprised mostly of men and that these two career paths, more than any other URL officers (as demonstrated in Appendix A), are the least flexible in their ability to fit in a utilization tour at any point in a career. As a result, these two designators, more than any other URL

officer designator, tend to suppress the utilization rates at NPS and in the Department of Administrative Sciences.

In summary, the Department of Administrative Science's "DoD Compliance" rates are higher than NPS as a whole because of the relatively greater number of women and the relatively lower number of SWOs (1110) and Pilots (1310) in the department.[15] Indeed, if SWOs (1110) were removed from the 1985 NPS cohort, the "DoD Compliance" rate would increase to 87.4 percent; and removing Pilots (1310) along with the SWOs (1110) from the 1985 cohort yields a "DoD Compliance" rate of 93.8 percent for NPS as a whole.[16]

Within the near future, it is likely that women will be allowed, by law, to serve in most combat roles along with their male counterparts. A serious implication for those interested in NPS utilization rates will then be: with more women serving as SWOs (1110) and Pilots (1310), utilization rates for women can be expected to decline. This implies that

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[15] The SWOs (1110) make up 36.3 percent of the total number in the 1985 cohort from the Department of Administrative Sciences. Pilots (1310) account for 15.3 percent. Both are lower than the overall NPS proportions (41.5 and 22.7 percent, respectively). Together, these two designators only account for 51.6 percent of the department's total, 12.6 percentage points less than for NPS as a whole.

[16] It should be noted again that SWOs (1110) and Pilots (1310) are predominantly male officers. In fact, for the 1985 cohort, the SWOs (1110) had no women and Pilots (1310) had only one.

the overall NPS utilization rate may also decline. If this is true, then it is important to address the utilization issues associated with SWOs (1110) and Pilots (1310) now, while the problem is smaller than it may be in the future.

C. RECOMMENDATIONS

What, if anything, can the Navy do to improve (or address the issue of) the return on its investment in graduate education and decrease the depreciation of its assets? Several recommendations are offered below.

1. Conduct Comparative Studies

One approach to answering the question posed above would be to thoroughly analyze the costs and benefits of how *other* Services pursue their graduate education programs. (The Army's method was briefly reviewed in the literature review.) For example, it would be interesting to study the patterns of subspecialty utilization for the Air Force officers who graduate from the Air Force Institute of Technology (AFIT), located at Wright-Patterson Air Force Base in Dayton, Ohio.

2. Modify the Window for DoD Compliance

Another approach would be to evaluate extending the current DoD policy for utilizing officers who have obtained a graduate degree from two tours to, perhaps, three tours after graduation. This would allow naval officers more time to be utilized in compliance with DoD regulations. The obvious

disadvantage is the additional technical obsolescence and knowledge deterioration incurred by a policy such as this. Additionally, how many of these graduate-educated officers will still be in the Navy to make this policy effective?

Another question that must be addressed is the rationale for the DoD guideline (that is, utilization within two tours). Why is the policy centered on two tours and not "some time" within an officer's career or "soon after" graduation (but contingent on organizational effectiveness)? Is the answer merely technical obsolescence and knowledge deterioration? Should the two-tour guideline be considered as *always* desirable for organizational effectiveness? As previously observed, some officers obtain a graduate degree but are probably better suited to serve in a position that may not qualify as "subspecialty utilization." The problem, then, becomes one of selection to NPS, which is beyond the scope of this thesis.

3. Expand the Number of P-Coded Billets

The Subspecialty P-Code Matrix, Appendix E, could be evaluated to make a wider range of billets P-Coded. This would mean, perhaps, that more operational billets could be P-Coded. If more P-Coded operational billets were available to graduate-educated naval officers, they could not only stay focused in their warfare specialties, but could simultaneously

utilize their subspecialties. This, in turn, might increase the "DoD Compliance" rates among the SWOs (1110) and Pilots (1310). There are probably many such billets of this type that could meet both the Navy's operational needs and the goals of subspecialty utilization.[17] (An issue to consider here, again is the desirability of full DoD compliance, as suggested above.) Would the "P-Coding" of operational billets detract from or supplement readiness? How would more P-Coded operational billets affect NPS quotas, the detailing process, and the ability of non-graduate-educated officers to successfully serve in these billets?

4. Develop Improved Data Resources

NPS should maintain its own data base of all students who attend the institution. This data base would follow the careers of graduates, *independently* of the OMF. In this way the school would have a "clean" and complete data resource for institutional research and analysis. This is not the case at present. Indeed, to get data relating to graduate education at present, one must, with the assistance of the Defense Manpower Data Center, write a program to obtain the necessary information from the OMF. These data are often incomplete,

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[17] Further alternatives for NPS are discussed in a paper by the author entitled, "Issue Brief: Utilization of Naval Postgraduate School Alumni."

with missing information and other inaccuracies. The school and students have no control over the completeness of the data base. Thus, analysis of the data must be done recognizing these limitations.

5. Conduct Further Research

Further research should be conducted using the Navy Billet File and cross-referencing it with the OMF, as PERS-213 currently does. These data could then be used to follow a cohort for seven or more years to capture DoD compliance rates and information on officers utilizing their degrees but not within the period of DoD compliance.

The initial hypothesis concerning utilization of graduate-educated URL officers was that the Navy may not be receiving as great a return on its investment as it could. While this may still be true, the problem may not be as severe as initially indicated, given the current policy constraints, career milestones, and many other factors placed upon the Navy. Nevertheless, the Navy, for its own benefit, as well as the benefit of all naval officers, should still strive for fullest possible compliance with DoD guidelines.

APPENDIX A

CAREER PROGRESSION PATHS OF URL OFFICERS

GENERAL UNRESTRICTED LINE OFFICER PROFESSIONAL DEVELOPMENT PATH

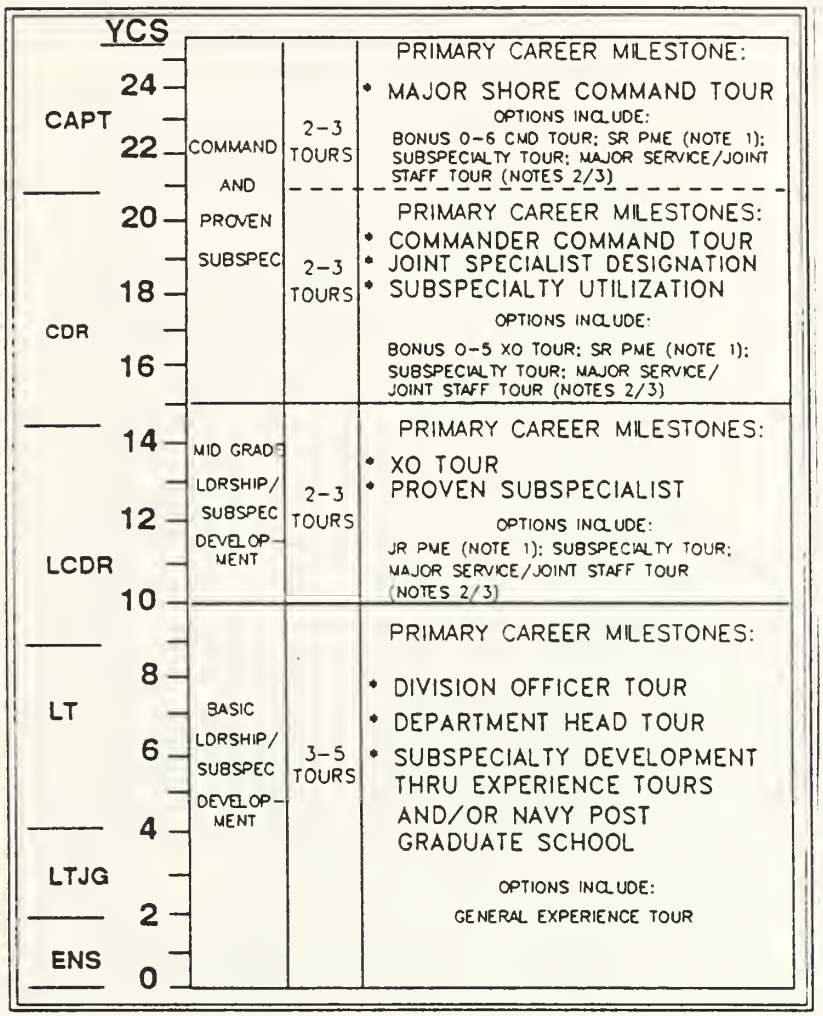


Figure 1.

General Unrestricted Line Officer (1100) Career Progression Path

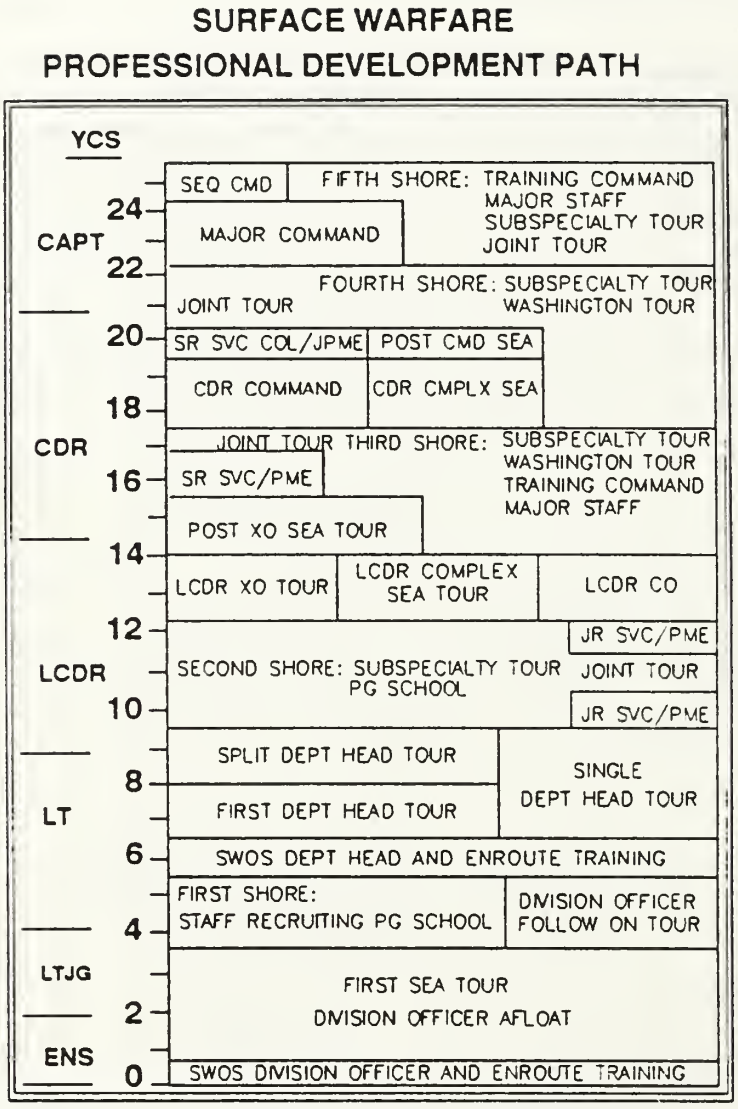


Figure 2.

Surface Warfare Officer (1110) Career Progression Path

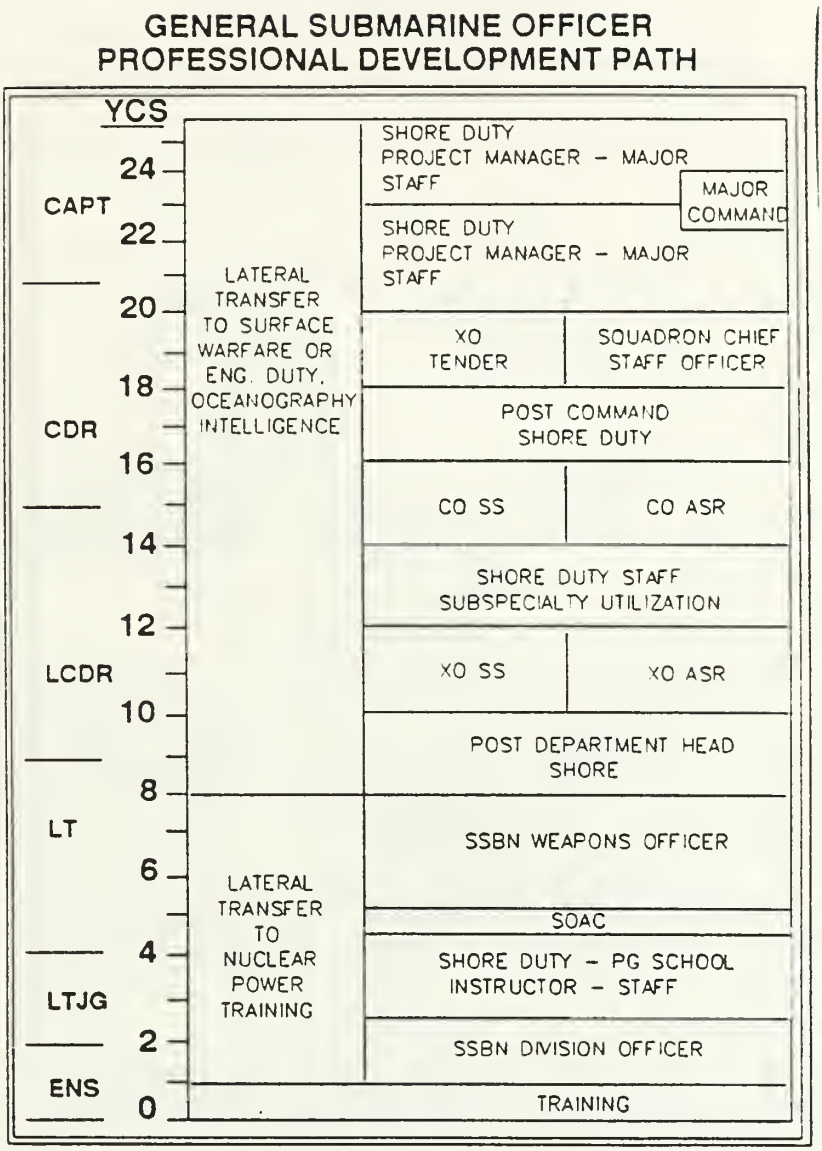


Figure 3.

Submarine Warfare Officer (1120) Career Progression Path

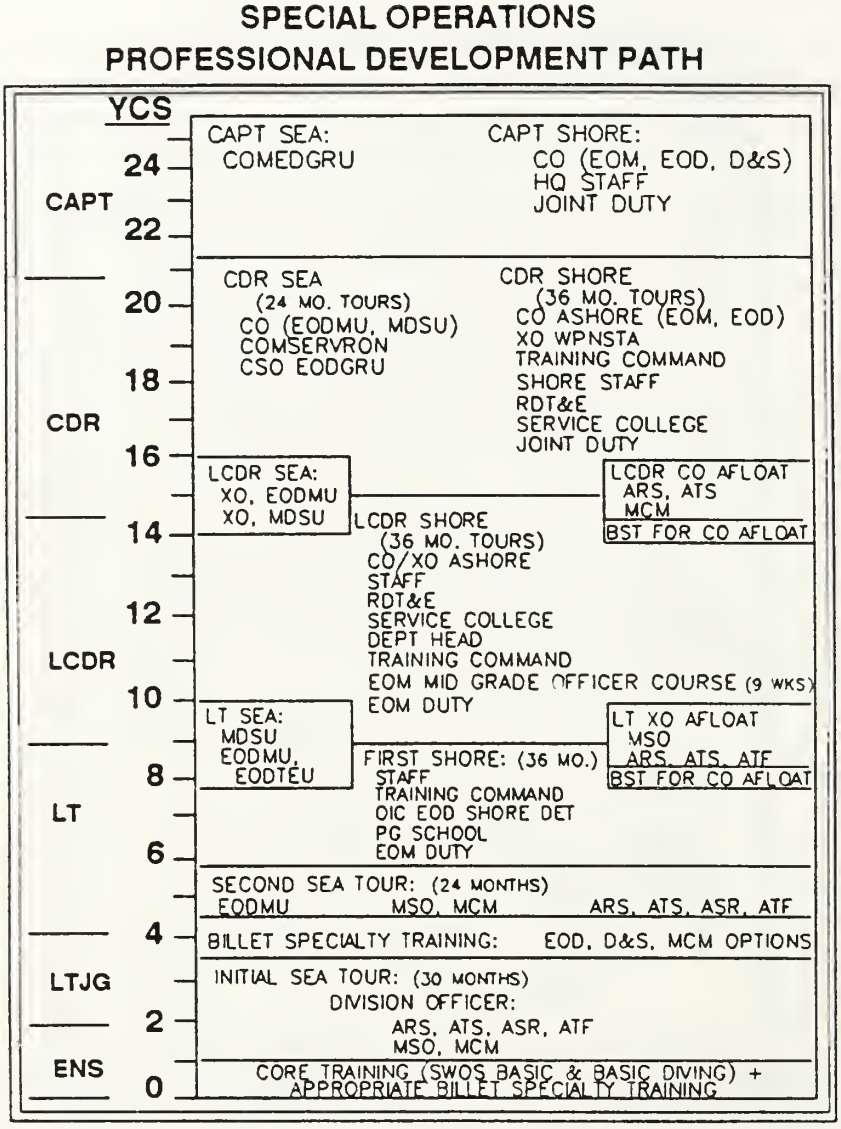


Figure 4.

Special Operations Officer (1130) Career Progression Path

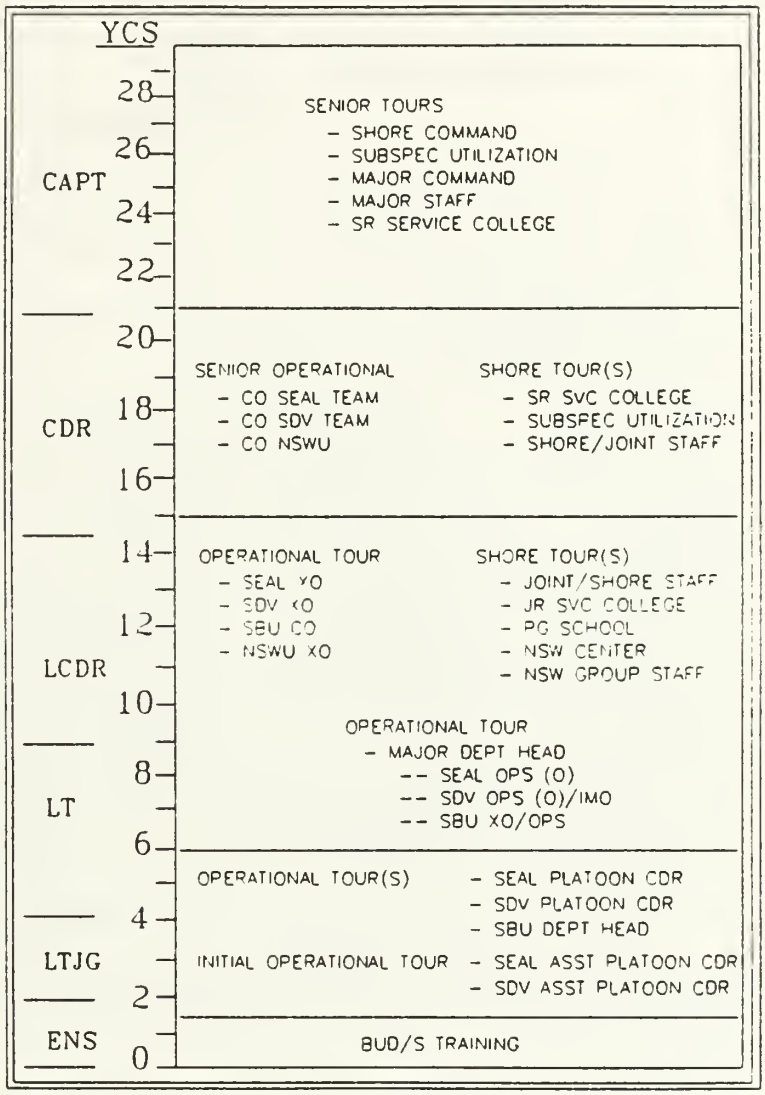


Figure 5.

Special Warfare Officer (1140) Career Progression Path

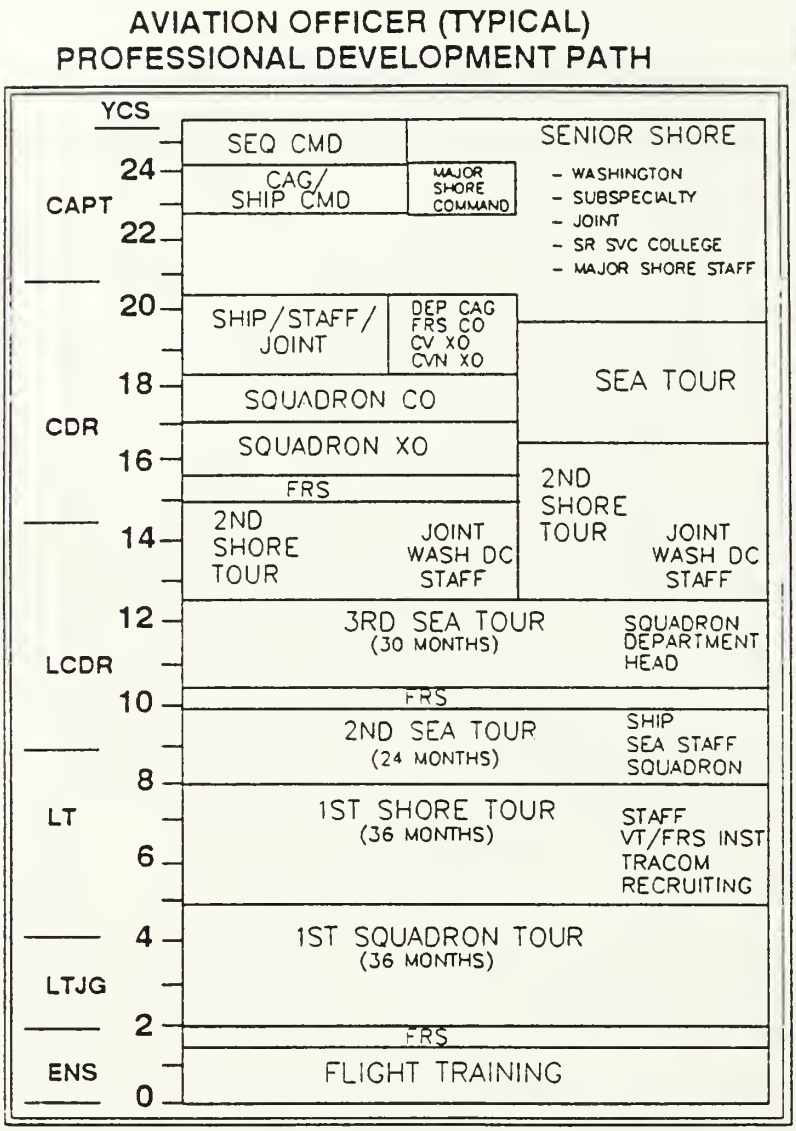


Figure 6.

Pilot (1310) and Naval Flight Officer (1320) Career Progression Path

APPENDIX B

DESCRIPTION OF THE SUBSPECIALTY CODES

The first two digits in a subspecialty code, such as 0033P, denote a unique field, referred to as a functional field. This field changes from 00 to a more descriptive code (for example 10, 20, 30, and so on) denoting the particular area in which an officer received his or her Q-Code.

The second two digits of the subspecialty code, such as XX33P, describe the education field in which the officer obtained a subspecialty, and is usually referred to as an educational/training/experience field. These two digits are the ones most relevant to this thesis.

The suffix attached to the subspecialty code (as in XX33P) states the level of education or experience pertaining to the subspecialty and is referred to as a subspecialty code suffix. In the case of this thesis, the suffixes P and Q are the most relevant. P means an officer has been assigned a subspecialty based on completion of graduate education. Q means the officer is a proven subspecialist, having served successfully in one or more billets pertaining to his or her subspecialty or an approved, related subspecialty, after completion of graduate education. (See Appendix E, Subspecialty P-Code

Matrix.) For example, an officer possessing a subspecialty of 0042P (Operations Analysis) can obtain a Q-Code by serving a utilization tour in a 0033P (MPTA), P-Coded billet.

The Proven subspecialist codes (i.e., Q and R) apply only to URL officers and to the designators 2300 (Nurse Corps) and 2900 (Medical Service Corps). Further, these codes only apply to the ranks of Lieutenant Commander through Captain. (R denotes a proven subspecialist with significant experience in the field of Plans and Programs. This code does not require that the officer possess a master's degree.)

A P-Code requires the combination of both professional experience and extensive knowledge of theories, principles, processes and/or techniques certified through the acquisition of the master's degree for optimum performance of duty.

A Q-Code requires either the conception, implementation, appraisal, or management of complex Navy and/or DoD programs. Also, one of the following criteria must be met: the officer must routinely interact with personnel who possess a master's degree; or the officer must exercise technical, educational, or managerial supervision over personnel who possess a master's degree. Further, the billet requires a proven subspecialist at the master's degree level. This naval officer is usually "board-selected" as a proven subspecialist

after successful completion of one or more significant tours in master's degree-level billets in the subspecialty field.

APPENDIX C

SUBSPECIALTY CODES

TABLE 6--SUBSPECIALTIES, THEIR P-CODES, AND CURRICULUM CODES OFFERED BY THE NAVAL POSTGRADUATE SCHOOL

Curriculum Name	P-Code	Curric Code
Advanced Sciences	41	380
Aeronautical Engineering	71	610
Aeronautical Engineering-Avionics	72	611
Air-Ocean Sciences	47	373
Anti-Submarine Warfare Systems	44	525
Command, Control, and Communication	45	365
Communications Engineering	81	600
Computer Science	**91**	**368**
Computer Systems Management [Unk]	**95**	**367**
Electronic Systems Engineering	55	590
Electronic Warfare Systems Engineering	46	595
Financial Management	**31**	**837**
Intelligence	17	825
Manpower, Personnel, and Training Analysis	**33**	**847**
Material Logistics Support Management	**32**	**827**
Meteorology	48	372
Naval/Mechanical Engineering	54	570
National Security Affairs- Europe, USSR	24	684
National Security Affairs- FE, SE Asia, Pacific	22	682
National Security Affairs- ME, Africa, South Asia	21	681
National Security Affairs- Strategic Planning	28	688
National Security Affairs- Western Hemisphere	23	683
Nuclear Physics [D]	67	532
Operational Logistics	43	361
Operations Analysis	42	360
Space Systems Engineering	77	591
Space Systems Operations	76	366
Transportation Management	**35**	**814**
Underwater Acoustics [D]	56	535
Weapons Systems Engineering [D]	61	530
Weapons Systems Sciences [D]	63	531
Communications Systems Technology [D]	***82***	***620***
General Political Science [D]	*20*	
National Security Affairs- Int'l Negotiations [D]	*25*	*684*

National Security Affairs- Strat Planning(Gnrl)[D]	*26*	*686*
National Security Affairs- Strat Planning(Nclr)[D]	*27*	*687*
Education and Training Management [Unk]	*37*	
Nuclear Propulsions Plant Operations [Unk]	*53*	
Chemistry [D]	*62*	
Acquisition and Contract Management	***06***	***815***
Systems Inventory Management	***02***	***819***
Transportation Logistics Management	***04***	***813***
Information Technology Management	***89***	***370***
Operational Oceanography [Unk]	*49*	*374*
Special Operations and Low Intensity Conflicts	*29*	*699*
Combat Systems Sciences	*66*	*533*

Note: P-Codes should be read with an "XX" prefix and a "P" or "Q" suffix, depending on whether or not a utilization tour has been successfully completed.

Source: Compiled from the Office of the Registrar, Naval Postgraduate School, the 1991 Naval Postgraduate School Catalog, and from department secretaries or chairmen.

Subspecialties, P-Codes, and curriculum codes that appear in **bold** print are in the Department of Administrative Sciences. Subspecialties, P-Codes, and curriculum codes that appear in *italics* are not included on the Registrar's current list of subspecialties. The reason for their exclusion is given after the subspecialty. A [D] indicates that the curriculum has been deleted, or not offered by NPS some time after 1985. A [Unk] indicates the current status of this curriculum is unknown since 1985.

Information Technology Management, ITM, (XX89P) combined Computer Systems Management (XX95P) and Communications Systems Technology (XX82P) in 1991. But for purposes of this study,

Computer Systems Management (XX95P) and Communications Systems Technology (XX82P) will be considered separate curricula.

National Security Affairs-Strategic Planning (and International Organizations and Negotiations) (XX28P) combines the National Security Affairs-International Negotiations (XX25P), National Security Affairs-Strategic Planning (General) (XX26P), and National Security Affairs-Strategic Planning (Nuclear) (XX27P) curricula in 1991. Again, for purposes of this study, the curricula will keep their pre-1991 codes.

Naval/Mechanical Engineering (XX54P) has been recently changed to Total Ship Systems Engineering (XX54P). Weapons Systems Engineering (XX77P), Weapon Systems Sciences (XX63P), Nuclear Physics (XX67P), and Underwater Acoustics (XX56P) have recently been combined into Combat Systems Sciences (XX66P).

APPENDIX D

RANKS AND THEIR OMF CODES

TABLE 7--RANKS AND THEIR ASSOCIATED OFFICER MASTER FILE CODES, PAY GRADE CODES, AND ABBREVIATIONS.

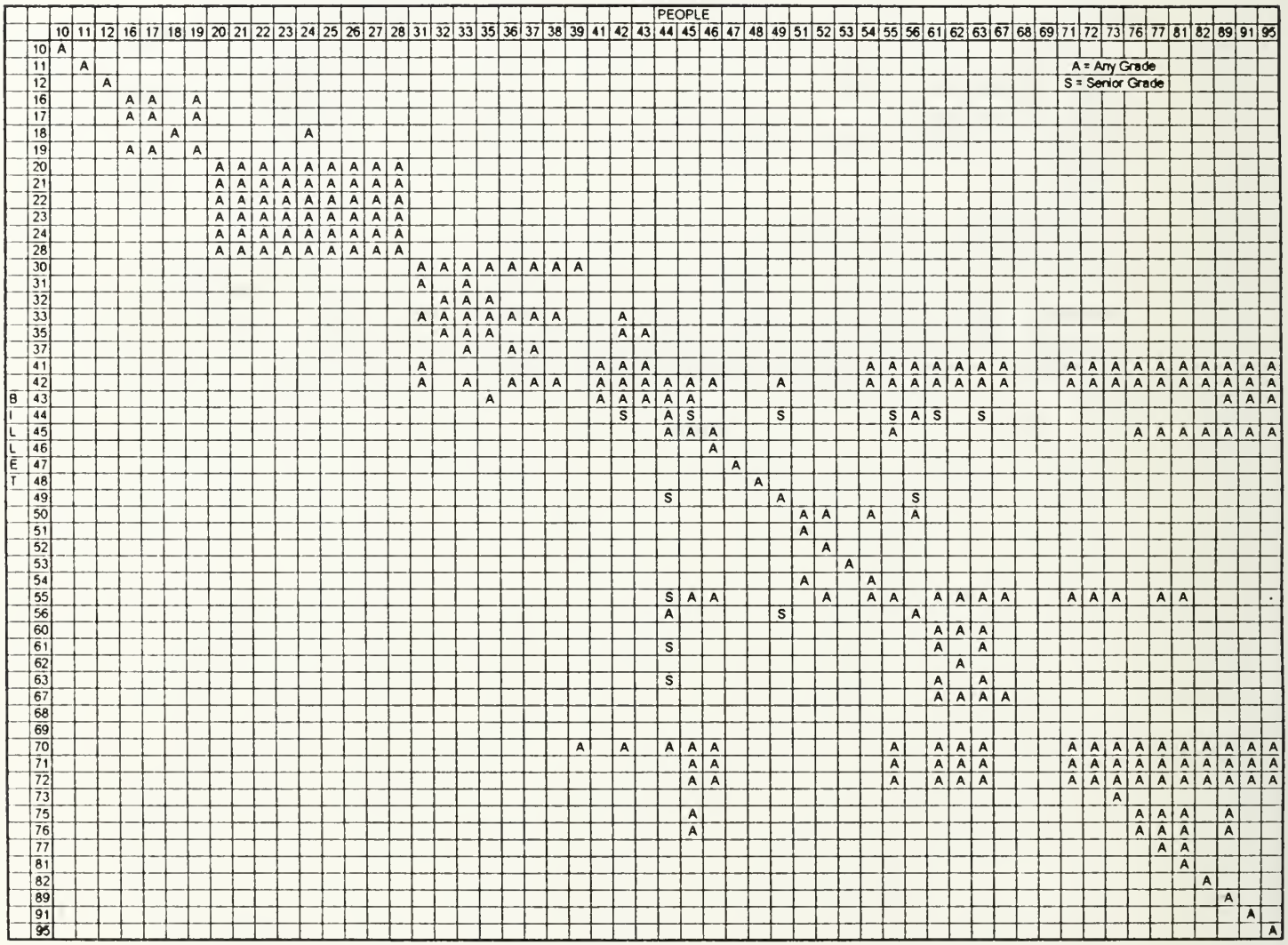
Rank	OMF Code	Pay Grade	Abbreviation
Admiral	B	O10	ADM
Vice Admiral	C	O9	VADM
Rear Admiral	D	O8	RDMU
Rear Admiral Lower Half	E, F	O7	RDML
Captain	G	O6	CAPT
Commander	H	O5	CDR
Lieutenant Commander	I	O4	LCDR
Lieutenant	J	O3	LT

Note: Rear Admiral Lower Half has two OMF Codes. The F is a billet code and the E is a Personnel code.
Source: Compiled from NAVPERS 15839H.

APPENDIX E

SUBSPECIALTY P-CODE MATRIX

TABLE 8--SUBSPECIALTY P-CODE MATRIX.



Source: Pers-213.

The Subspecialty P-Code Matrix has an officer's SSC across the top (with the "XX" prefix and the "P" suffix removed). Any "A" (Any officer) or "S" (Senior officer) in the column indicates P-Coded billets an officer is eligible to fill (read from the left-hand column) for a utilization tour. For example, an officer graduating from the Manpower, Personnel, and Training Analysis curriculum (XX33P) would look across the top to the "33" column. Then he or she would look down the column to determine eligible billets he or she is able to fill for a utilization tour. In this example, the P-Coded billets include: XX30P, XX31P, XX32P, XX33P, XX35P, XX37P, and XX42P.

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